

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

Vol. 53]

1956

[No. 6

THE OCULAR COMPLICATIONS OF COMMON TROPICAL DISEASES

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Malaria

Fortunately, in view of the enormous amount of malaria met with in tropical and sub-tropical countries, it is rarely associated with serious ophthalmoplegic lesions directly caused by the plasmodium, though some observers give the impression that in some countries such lesions are relatively frequent. The manifestations are ocular and peri-ocular pain. Headache is a constant symptom during the acute attack, both in the eye-balls and frontal regions, and in some cases it dominates the clinical picture

and is accompanied by marked photophobia. Trigeminal neuralgia occurs with relative frequency, generally involving the ophthalmic branch, and the pain is intense and prolonged. The neuralgia shows the intermittency characteristic of malaria. There are cases of latent malaria in which it is the only manifestation. During the acute febrile period there is often a slight ptosis, especially when the ocular pain is severe. During and after the acute phase a patch of herpes may appear on the eyelids, but more frequently on the lips, and there is marked hyperaemia of the palpebral and bulbar conjunctivae. After frequent attacks of malaria the conjunctiva becomes pale and may show thickening and diffuse pigmentation in the palpebral fissure.

During the acute attacks, but more frequently a few days after the temperature has returned to normal, dendritic or herpetic keratitis may occur. Most observers agree that this is the most frequent ocular complication of malaria. The keratitis occurs in one eye only and its onset is marked by discomfort, photophobia and lachrymation. The cornea is hyperaesthetic and the lesion stains with fluorescein in the typical dendritic pattern. These dendritic ulcers take some weeks to heal. The pupil should be kept dilated with 1 per cent. atropine once daily and the eye covered with a pad. It should be borne in mind that herpes corneae occurs in a number of febrile conditions and in other states in which the bodily resistance is lowered; it cannot be regarded purely and simply as a manifestation of plasmodial disease.

Much less often, interstitial keratitis occurs. It is associated with clouding of the stroma, and severe forms have been described as keratitis profunda and disciform keratitis. It is questionable whether true interstitial keratitis is ever caused by malaria, but malaria may precipitate an attack in the same way as injury or debilitating diseases. Uveitis, often serious, occasionally occurs and is probably an allergic manifestation of the uveal tract after it has been sensitized by the products of destruction of the malaria parasite. The cortical variety of cataract which is seen in young subjects often has a malarial background and there is a long history of repeated attacks of the disease.

After keratitis, retinal haemorrhages are the next most common ocular complications and are either small, multiple and peripheral, or large and central. The small, multiple haemorrhages occur during the pyrexial bouts as a result of the plugging of capillary vessels by parasitized cells or of changes set up by the parasites in the lining cells of the capillaries themselves. These tiny haemorrhages are especially common in *Plasmodium falciparum* malaria, and in cerebral malaria may be responsible for transient blindness. The blood is readily reabsorbed and rarely causes any permanent loss of vision. The larger retinal haemorrhages occur most commonly in the macular area and are associated with the profound anaemia of malignant malaria.

In blackwater fever subhyaloid haemorrhages are common. They lie between the retina and the hyaline membrane of the vitreous, may cover

a considerable area, and their shape is most often semilunar with the convexity downwards. They cause considerable loss of vision, but this is only temporary, and when the blood is absorbed vision usually returns to normal.

The neurological lesions of most significance, as far as they affect vision, are those of the retina and optic nerve or of the pathways of the brain. The common manifestation is scotoma or loss of vision lasting from a few minutes to several hours, followed by severe headache and diminished visual acuity. Lesions in the optic nerve and in the fundus sufficient to account for the amblyopia and amaurosis occur in some cases, and cerebral changes are responsible for the disturbance in others. The lesions are optic neuritis, usually bilateral, or more rarely atrophy of the optic nerve, and degenerative or haemorrhagic lesions of the retina and choroid.

In blackwater fever jaundice and anaemia are observed in the conjunctiva. As a rule no lesions occur in the cornea and iris and the retinal changes run parallel with the anaemia. Tortuosity of the retinal veins occurs with typical retinitis. Retinal haemorrhages are frequent between 3rd and 17th days and may be large or small. These haemorrhages occur when the red cells fall below 3 million per cmm. and the amount of haemoglobin below 40 per cent., although in some cases in which the anaemia is profound no retinal haemorrhages occur. During the stage of convalescence the retina returns to normal and in most cases there is no residual loss of vision.

Quinine Poisoning

The toxic effects of quinine poisoning on the neural elements of the retina must be distinguished from malarial manifestations. Cases of quinine poisoning are rare but have been known to occur after quite small doses of the drug. The most important feature is individual idiosyncrasy. The first symptom is the sudden onset of partial or complete blindness, which may last for hours or days. The pupils are dilated and fixed, the disks are pale, the arteries thready and the retinae pale, with a deep reddish colour around the foveae. The prognosis for vision is good in patients who have had medicinal doses but the visual fields may show a permanent peripheral loss.

The treatment is to stop the administration of quinine at once and if antimalarial drugs are indicated, quinine should be replaced by chloroquine, mepacrine or other synthetic drugs. BAL (British Anti-Lewisite, dimercaprol) administered in a dosage of 200 mgm. in 24 hours in two divided doses, and repeated if necessary, has proved useful in quinine intoxication and appears to be the drug of choice.

Dysentery

Dysentery is common in tropical countries, and ocular complications do occur, but are rare. As a rule they are met in bacillary cases,

but are probably also a rare complication of amoebic dysentery. Acute conjunctivitis and iridocyclitis are symptomatic of dysenteric toxæmia and occur in association with arthritis. The iritis is usually bilateral, but may affect only one eye, is of plastic type and may be accompanied by cyclitis, causing adhesions to the anterior capsule of the lens, a thin exudate in the pupil, keratitic precipitates on the back of the cornea and gross vitreous opacities. There is marked circumcorneal injection with photophobia and blepharospasm. The aqueous humour has been found to agglutinate Shiga's bacillus (*Shigella dysenteriae* 1), although the tears do not contain specific agglutinins and dysenteric organisms have not been isolated from the conjunctival sac or iris. The ocular manifestations may be due to the entry into the blood stream of secondary bacteria from the alimentary canal. A point of interest is that the iridocyclitis often clears up rapidly when the appropriate general treatment for dysentery is given.

Treatment consists in the ordinary routine management of cases of conjunctivitis, iritis and iridocyclitis, together with general treatment for the variety of dysentery from which the patient is suffering.

Cholera

A very early ocular sign in cholera is a blue discoloration of the skin of the eyelids. Owing to the general dehydration in the disease, retraction of the eyeballs occurs and the eyes are kept half open. The patient can, however, close the eyes when told to do so, but after a little opens them again. In the late stages of cholera, retraction of the eyeballs within the cavity of the orbit is a marked feature. Like all the fluids of the body, the lachrymal secretion becomes dried up, allowing the conjunctiva and cornea to become vulnerable from irritation caused by exposure, dust and the assaults of insects. When the patient lies unconscious or semi-conscious, the eyeballs are rolled upwards, leaving the lower part of the corneae and conjunctivae exposed in the half-opened lids. This exposure, together with the absence of tears and the low vitality of the patient, leads to conjunctivitis, ulceration of the cornea, keratomalacia and even massive sloughing of the cornea and sclera. These complications can largely be prevented by proper nursing and treatment. At an early stage in the disease the pupils are dilated, and in the late stage the pupillary reflex may be absent. Vitreous opacities and cataract sometimes occur as sequelae of the disease and are due to involvement of the uveal tract during the acute stage. On ophthalmoscopic examination, the retinal arteries are seen to be narrowed and, like the veins, are of a very dark colour owing to the concentration of blood within them. Cholera patients often complain of misty vision. This is due to latent errors of refraction which become manifest under the debilitating influence of the disease, the scanty circulation through the retina interfering with its normal function and the obstruction of fluid in the tissues affecting the transparency of the cornea.

Post-choleraic conjunctivitis often occurs. This is due to exposure of the membrane, and its chronicity is due to the lowered vitality of the patient which persists long after recovery. Treatment is largely a matter of common sense. The eyelids should be cleansed with normal saline lotion. If the eyelids remain half open, the cornea should be protected by the frequent instillation of liquid paraffin drops into the conjunctival sac. Conjunctivitis should be treated with penicillin drops and ointment. If corneal ulceration occurs, 1 per cent. atropine drops should be instilled twice a day in addition to the penicillin treatment.

Leprosy

In tropical countries leprosy is one of the great causes of blindness and partial loss of sight. Ocular involvement is frequent but varies in different countries and races. The incidence of eye lesions is higher in lightly pigmented races such as Europeans, Anglo-Indians, Chinese and South Americans than in the darkly pigmented Indian and African races. The eyes do not become seriously involved in the earliest stages of the disease except in a few cases, so if the disease could be diagnosed early and correctly treated, serious eye lesions would not occur. The gravity of ocular involvement is directly dependent upon the type of the disease. In the lepromatous type the eye complications are serious and are caused by the actual leprous infiltration, both superficial and deep. In the non-lepromatous type in which the peripheral nerves are involved, there is no actual leprous lesion of the eyeball; the branches of the VII nerve are frequently involved, giving rise to lagophthalmos from myo-atrophy of the orbicularis muscle. In the tuberculoid type the eyes are not involved except in those cases in which tuberculoid lesions are situated in the vicinity of the eyes. In these patients, madarosis, mild conjunctival congestion, hypo-aesthesia and anaesthesia of the conjunctiva occur.

Distribution of Ocular Lesions

1. The Superciliary Region and Eyelids

Alterations of the superciliary region and the eyelids comprise madarosis, lepromas, infiltrations, macules, anaesthesia and lagophthalmos. They are found in all the clinical forms of leprosy, and are of very great importance not only for general diagnosis but also for diagnosis of the type of the disease. Madarosis, both superciliary and ciliary, is a very common sign, which appears slowly and usually during the first few years of the disease. It occurs in the lepromatous and tuberculoid forms but not in the pure nerve form. Lepromas may be found on the margin and other points of the upper eyelid, but not on the lower eyelids. Lagophthalmos occurs in the non-lepromatous type and the expression that it gives to the patient's eye is pathognomonic. It may be unilateral or bilateral. The palpebral fissure little by little becomes wider in proportion to the progressive weakness of the orbicularis oculi muscle; later the

superciliary and the frontal muscles become involved. The lagophthalmos produces ectropion of the lower eyelid with epiphora and later xerosis of the conjunctiva and cornea. Occasionally an ulcer on the lower third of the cornea may occur as a result of exposure. Once leprous lagophthalmos is established, it is usually permanent and will not recede, but, despite the cornea being so much exposed, it is remarkable how many of these patients escape corneal ulceration over a very prolonged period extending into years.

2. *The Cornea*

The cornea is the most vulnerable of the ocular tissues and is very frequently involved. All varieties of keratitis are seen and can be classified into primary and secondary. The primary comprise five groups—pannus, sclerosing keratitis, superficial punctate keratitis, deep or interstitial keratitis and leproma of the cornea. Lesions of the sclera and limbus precede or accompany the keratitis. The secondary lesions comprise the ulcerative group which may occur in lagophthalmos and when there is loss of sensitivity of the cornea. Pannus is very common and presents itself in the form of a net, the meshes of which are composed of uniform branching blood vessels, in contra-distinction to the pannus of trachoma in which the new blood vessels are terminal and arranged in the form of bundles. It is seen in all stages from early vascularization in the upper third of the cornea to the grave forms which cause partial or complete hyperplastic keratitis. Superficial punctate keratitis is probably the most common ocular lesion in leprosy and is quite unlike other types of superficial keratitis; its presence is pathognomonic. It usually begins at the superior limbus as a light milky haze, punctuated by tiny white spots resembling grains of chalk and varying in size. These spots are miliary lepromas. The keratitis is accompanied by superficial vascularization and is not truly superficial; at the limbus it affects the deeper layers, but tends to remain superficial as it spreads into the centre of the cornea. The lower margin is delineated by a wavy line above the pupillary centre of the cornea so that at first vision is not impaired, but when the keratitis extends over the whole cornea the vision will be permanently and seriously affected.

3. *The Iris and Ciliary Body*

The serous or plastic type of iritis or iridocyclitis is the most frequent and is characterized by its insidious onset and relentless chronicity. In the early stages the eye is relatively quiet and the only symptom is the gradually decreasing visual acuity. In the beginning the synechiae are very few and are only discovered by the corneal microscope or the instillation of atropine drops. They slowly increase and may involve the whole circumference of the pupil. Plastic iridocyclitis is indicated by the presence of keratitis precipitates on the corneal epithelium, and exudates

on the anterior lens capsule are often present as well. All the graver manifestations may be observed, *viz.* posterior synechiae with seclusion and occlusion of the pupil, secondary glaucoma, opacities of the vitreous and lens, hypertension, retinal detachment and atrophy of the eyeball. Acute diffuse plastic iridocyclitis of sudden onset, somewhat similar to the ordinary non-specific acute iridocyclitis but of a more violent nature, is sometimes seen. It is not very common and is usually due to the lepra reaction in the eye and may be unilateral or bilateral. It is accompanied by very severe pain, lachrymation, photophobia, circumcorneal injection, extensive posterior synechiae and exudation into the pupil and vitreous body. It usually results in blindness or great loss of sight. Miliary lepromas on the anterior surface of the iris are often seen, usually accompanied by the co-existing changes of superficial punctate keratitis. They are greyish yellow, pedunculated or flat, pin-point bodies scattered irregularly on the iris and on the exudates on the anterior lens capsule. They are characteristic and pathognomonic of leprosy and resemble the tiny white spots found in the cornea. They are liable to be overlooked unless the eye is examined with the corneal microscope. Ocular leprosy is characteristically a disease of the anterior segment of the eye and lesions of the posterior segment behind the ora serrata only rarely occur by direct spread backwards from the iris and ciliary body. Loss of vision in leprosy is caused by changes in the cornea and plastic iridocyclitis.

Up to the advent of the sulphones, treatment was fraught with disappointment. The benefit to the eyes from sulphone therapy is remarkable but the early diagnosis of eye lesions, and early treatment both local and general, are of great importance. In incipient cases the specific lesions of the cornea and iris very slowly recede but not in advanced cases in which profound changes in the ocular tissues have already occurred, although even in the grave cases much can be done to prevent blindness. During the early months of sulphone therapy the eyes must be carefully watched in case the lepra reaction occurs. This is the most terrible ocular complication of leprosy. Great care therefore should be taken against injudicious or inadequate treatment. During the acute eye condition 1 per cent. atropine drops or ointment should be instilled morning and evening. Local application of cortisone in 1 per cent. drops or ointment is most valuable, as an acute unchecked inflammatory reaction will cause occlusion and seclusion of the pupil with secondary cataract and secondary glaucoma. The cortisone should be used frequently and continued till the eye is white.

In leprosy cases the eye should be frequently observed and if early signs of iritis are observed, the pupils should be kept dilated by atropine. These early signs are often only discovered by the corneal microscope and one should always be available in hospitals where leprosy is treated. If the pupil fails to dilate sufficiently or if secondary glaucoma occurs, an iridectomy should be done. The leprosy eye, despite the chronic inflammation, stands surgery very well.

Scrub Typhus

The ocular lesions of this disease include the eschar which develops at the site of the mite bite and is accompanied by considerable swelling of the eyelid with enlargement and tenderness of the preauricular or submaxillary glands. Conjunctival hyperaemia with or without haemorrhages and without involvement of the cornea occurs in the acute stage and clears up about the fourteenth day. The fundi show a vitreous haze with engorgement of the retinal veins and oedema of the optic disk and retina. The vitreous clears about the end of the third week and visual acuity is not affected except in patients who develop bilateral uveitis. The uveitis is of infrequent occurrence and responds slowly to treatment with 1 per cent. atropine drops and cortisone drops or ointment, and leaves no residual defects. The ocular signs suggest that the lesions of the uveal tract, papilla and retina are caused by invasion of these tissues by rickettsial bodies.

Trypanosomiasis

Except for lesions of the optic nerve, the ocular complications of trypanosomiasis are very rare and when they do occur are not serious and clear up rapidly on treatment. They take the form of mild optic neuritis with transitory vascular changes. The disease is often accompanied by onchocerciasis which frequently attacks the eyes, causing keratitis, iridocyclitis, choroidoretinitis and optic atrophy, and the ocular lesions found in patients with trypanosomiasis are usually due to onchocerciasis. Blindness from trypanosomiasis does not occur other than in persons under treatment with pentavalent arsenical preparations (tryparsamide, atoxyl) which are a frequent cause of serious lesions of the optic nerve, often ending in blindness from degeneration of the ganglionic cells of the retina. Those suffering from accompanying syphilis are more prone to the toxic action of these preparations. Ocular disturbances come on some weeks or months after treatment and develop in 4 stages:—(1) The condition is entirely subjective, the patient complaining of metamorphopsia and a sensation of movement as when looking through shimmering smoke; (2) within a few days there is a general depression of vision, with loss of the peripheral field for even large objects, followed by a marked diminution in central acuity; the appearance of the optic disks still remains normal; (3) after about two weeks, pallor, unaccompanied by vascular abnormalities, appears in the optic disks and the patient may become completely blind, having inactive dilated pupils; (4) the stage of recovery, which may proceed for six months. There may be a complete return of central acuity of vision, accompanied by improvement in the peripheral fields. The pallor of the disks remains unchanged, but normal acuity of vision may be compatible with almost complete pallor of the disks. In such cases gross limitation of the visual fields will be found. In some cases recovery does not occur and the fundi show complete primary optic atrophy.

Tryparsamide is the most widely used pentavalent preparation of arsenic. Only the freshest and purest preparations should be used. In normal doses it is probably a comparatively safe drug, and the ocular complications associated with its use are due to impurities. The injections of tryparsamide should be stopped as soon as eye symptoms appear. Lumbar puncture, paracentesis of the anterior chamber of the eye, and the use of vasodilators, have not proved of much value. The most satisfactory results in arsenical intoxication have been obtained with BAL (British Anti-Lewisite). This is given parenterally, 300 mgm. daily for four days and 200 mgm. for three days—in doses of 100 mgm.—making 18 injections in one week. Early treatment of ocular manifestations often brings about a quick return of central vision.

American trypanosomiasis (Chagas's disease) presents signs quite different from the trypanosomiasis due to *Trypanosoma gambiense* and *T. rhodesiense*. The conjunctiva is often the seat of inoculation of the infected excreta of the reduviid bugs, producing follicular conjunctivitis, adenitis of the lachrymal gland and unilateral oedema of the upper and lower eyelids. The oedema is hard and usually not painful. This constitutes Romaña's sign which is typical of the disease.

Filariasis

Wuchereria bancrofti is present in one form or another throughout most parts of the tropics. It is not responsible for a vast amount of eye trouble. The adult worm is met chiefly in the lymphatic glands and although it has been reported in the anterior chamber of the eye, this is a rare occurrence. It may cause oedema and inflammation of the upper eyelids, accompanied by great irritation, and may give rise to elephantiasis of the upper eyelids.

It is interesting that intra-ocular filarial parasites are quite common in horses and cattle in India and China. They produce signs of irritation and clouding of the cornea, turbidity of the aqueous and iritis. If the parasite is removed at an early stage, the prognosis is good and the cornea recovers its transparency, but otherwise the prognosis is bad. It is a fascinating sight to see the worm swimming about in the anterior chamber of the eye. The extraction is usually easy, the animal is thrown and after the eye has been cocainized, a keratome incision is made in the upper third of the cornea without the loss of aqueous. When the worm enters the anterior chamber, the lower lip of the wound is depressed by a curette and the worm is expelled in the gush of aqueous.

It is remarkable that microfilariae of *W. bancrofti* are not found in the eye although in a very high percentage of the population they are found in the peripheral blood.

Loa loa is widely distributed throughout tropical West Africa from Sierra Leone to Benguela and especially the Congo. The adults are long-lived and may be present without microfilariae in the blood, so that

Europeans from West Africa may discover their presence after leaving the tropics. Unlike *W. bancrofti* or *Onchocerca volvulus*, the worm does not penetrate the eyeball. It has a tendency to appear about the orbital region, and a Calabar swelling may appear in the upper eyelid. This appears suddenly and disappears gradually. The swelling is hot to the touch, is usually painless, and never suppurates. When the worm appears in the connective tissue in the neighbourhood of the eye, especially at the inner canthus, it causes great irritation and pain which may become intense when it burrows under the conjunctiva; when it disappears into the deeper tissues instant relief is obtained. The removal of a worm from under the conjunctiva may be followed by a visit of another worm within a very short period. Removal often presents difficulty, as the worm may travel across the surface of the eyeball very quickly or may disappear in a few minutes when disturbed by the surgeon during the examination of the eye. Treatment consists in the removal of the worm, and everything that is required to remove it must be in readiness in case it tends to escape, and if necessary it should be seized through the conjunctiva with a forceps even if cocaine anaesthesia is not complete. The grip should be maintained while the eye is being cocaineized and when sensation is abolished the worm is removed in the ordinary way.

Onchocerca volvulus is the most important of all the filarial worms that infest the eye. It is found in West Africa, East Africa and Central America. In the Northern Gold Coast 600,000 of a total population of 1,000,000 have onchocerciasis and 40,000 are blind. In Nigeria the disease is said to be increasing and in neighbouring French territories there are thought to be at least 200,000 sufferers. Ocular manifestations are frequent and can help in the diagnosis of the variety of filariasis. Lesions of the choroid, retina and especially of the optic nerve are the most serious, but lesions involving the anterior segment of the eye are more frequent. The conjunctiva may contain numerous microfilariae and they are sometimes found there in cases in which they have not been found in skin snips taken from different parts of the body. In some patients the microfilariae do not cause any apparent reaction or lesion in the conjunctiva; in others they may cause chronic conjunctivitis with hyperaemia, thickening, absence of conjunctival secretions and more rarely the presence of small conjunctival nodules. These tiny nodules are about 2 mm. in circumference, reddish in colour, lying in or near the horizontal axis and at various distances from the limbus. It is, however, in the region of the limbus that the nodules are most characteristic and frequent. Here the microfilariae are more numerous and can find their way into the anterior chamber. Owing to phototropism of the microfilariae they are more numerous in that area of the limbus not covered by the eyelids. The conjunctiva in the region of the limbus forms a rampart 2-3 mm. in thickness, red in colour owing to dilated blood vessels and studded with minute spots brown in colour. These are seen in

African patients and less commonly in Europeans and are perhaps produced by the inflammation provoked by the microfilariae. The most typical corneal lesion is chronic avascular nummular keratitis situated in the superficial part of the substantia propria, and usually bilateral. The spots are discrete and are usually at first situated at the periphery of the cornea close to the limbus and so cause little visual disturbance till they have later progressed into the centre of the cornea. This keratitis may persist for years and leave permanent opacities. It seems to be directly due to the presence of microfilariae in the cornea. Their presence causes photophobia, lachrymation and blepharospasm and they are more readily detected in Europeans than in Africans.

With the corneal microscope, moving, living, microfilariae are rarely seen in the cornea, but dead microfilariae can often be seen, sometimes in considerable numbers. They are opaque, white in colour, rectangular in shape and lie parallel to the corneal surface. The aqueous humour of the eye often contains more or less numerous microfilariae which are very mobile, and bend and unbend quickly. They move about partly by their own activity and partly by the circulation of the aqueous, disappearing from view under the beam of the slit lamp, and not easy to follow. A simpler method of observing microfilariae in the aqueous humour is by the use of the electric ophthalmoscope incorporating a plus 20 D to a plus 28 D lens, held 3.5-5.0 cm. from the centre of the anterior chamber, *i.e.*, at the focal distance of the lens used. The pupils are first dilated with 1 per cent. homatropine drops and the whole of the pupillary area is illuminated by reflection from the fundus. The microfilariae, if present, can be seen in silhouette as tiny black threads swimming with a rippling motion through the aqueous humour. In remote areas of Central Africa, where the disease is prevalent, this simple method of examining the eyes with the ophthalmoscope has great advantages over the use of the slit lamp and corneal microscope. It provides a rapid and simple method for the early diagnosis of ocular onchocerciasis, and occasionally microfilariae are discovered even when there are no ocular symptoms. Disintegrating microfilariae in the anterior chamber may form a false hypopyon, light brown in colour and situated at the bottom of the anterior chamber, drawing down the margin of the iris and making the pupil pear-shaped. This is one of the characteristic signs of the disease.

Iritis of the plastic type with posterior synechiae is not a common feature of the disease, but diffuse atrophy of the iris may often be seen. At first the surface is smooth, then it becomes dull, the pigment disappears and the iris develops the appearance of a sponge and is described as the "pumice-stone iris". Cyclitis indicated by the presence of keratitic precipitates occurs more frequently than iritis and may lead to secondary cataract and glaucoma and even to atrophy of the eye. Cataract is common in people over 40 years of age who show filarial lesions; other factors besides cyclitis, however, must be considered in the aetiology, such as the bright light of the tropical sun. Infection of

the vitreous may occasionally occur. Choroidoretinitis is manifested by varied and extensive signs. Pigmented particles of various forms and sizes alternate with white patches of choroidal atrophy. The small spots give the appearance of fine powdered salt on a red background, the larger spots have sharp margins white or yellow in colour, often in clusters resembling a bunch of grapes and in close proximity to the blood vessels. They resemble the lesions of the eye seen in tuberculosis. Retinal lesions are rare, but in some cases small retinal haemorrhages occur at the posterior pole, and in some cases pigmentary retinitis.

Optic neuritis and papillary oedema do not occur, but optic atrophy, both primary and secondary, is common. Primary optic atrophy is often accompanied by blindness and in these patients there may be little evidence of onchocerciasis. The aetiology is confirmed by the presence of microfilariae in the biopsy of the conjunctiva or skin. In recent infection the diagnosis requires repeated examinations. When optic atrophy is established, peri-arterial sheathing is seen, and in more advanced cases the artery is represented by a white track and is completely obliterated. The peri-arterial thickening appears to be due to the penetration of the microfilariae into the sheaths of the central blood vessels. Optic atrophy secondary to choroiditis is frequently seen, and most commonly in the juxta-papillary type of choroiditis.

Although a really satisfactory drug for the cure of onchocerciasis has not yet been found, much can be done to improve the less severe lesions, but results in advanced cases are variable. Diethylcarbamazine (Hetrazan, Banocide) immediately kills microfilariae but not adults and some larvae appear within 3 months. Repetition of the course of treatment after 6 months is advised. Allergic reactions, both systemic and locally in the skin and eye, are common but can usually be controlled by antihistamine drugs. Severe eye reactions are uncommon and respond well to cortisone. All nodules should be excised under local anaesthesia before diethylcarbamazine is given. Suramin (Antrypol) may kill the adult worms in the nodules but is too toxic to be given without constant medical supervision. Some workers have achieved good results by giving suramin and diethylcarbamazine together. Only "denodulization" can at present be recommended for mass treatment, and in countries where the nodules are chiefly found on the head, it has remarkably reduced the incidence of blindness.

SUMMARY OF RECENT ABSTRACTS *

V. LEISHMANIASIS †

VISCERAL LEISHMANIASIS

Epidemiology: Clinical Findings

Kala azar exists in Portugal, in two main foci, one in the north and one in the south, at the latitudes of Oporto and Lisbon respectively, but inland. DE AZEVEDO (p. 1176) shows that the disease is of the Mediterranean type, occurring sporadically and mainly in infants, and having the dog as reservoir. He discusses the epidemiology and course of the disease. The incidence has declined since the antimalarial service began to use DDT extensively, but the author does not think that this is necessarily reassuring, because many obscure points in the aetiology of this form remain to be cleared up.

CORRADETTI and NERI (pp. 620, 1177) and SEGANTI and PALOMBELLI (p. 884) report a focus of kala azar on the coast of Tuscany, where *Phlebotomus perniciosus*, *P. papatasi* and *P. minutus* have been caught. This is a typical zone of infant kala azar, in addition to the Vesuvius and Etna zones. Kala azar is endemic in most of Yugoslavia, and although it is found in dogs also in the regions near the Adriatic sea, the canine infection has not been found, or is rare, in Serbia and most of Macedonia, and SIMITCH *et al.* (p. 620) therefore conclude that the dog is not a reservoir in those areas.

Although Iraq is not considered an endemic area for kala azar, there have recently been several reports which indicate that it does occur. TAJ-EL DEEN and AL ALOUSI (p. 24) report 4 cases in children in Baghdad. They were severe, as is usual when the disease appears in a new area. Napier comments that oriental sore is endemic in Baghdad, but this new appearance of kala azar calls for extensive epidemiological investigation. KIRCHMAIR (p. 884) also reports kala azar in 3 infants near Baghdad. He had previously diagnosed cases in northern Iraq, and BASHIR (p. 260) now reports 6 cases in children in the same part of the country, and gives an account of their distribution; 5 villages are involved, at some considerable distance from each other. DENECKE and PFANNEMÜLLER (p. 25) record 2 cases in children living in poor surroundings in Iraq.

Kala azar has recently been reported from various places in Kenya, and HEISCH (p. 520) gives an account of the outbreak in the Kitui district, where some 3,000 cases were observed in 1953-54. A number of sandflies were found, including several new species, some of which,

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1955, v. 52. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leishmaniasis in this series see the June issues of the *Tropical Diseases Bulletin* each year since 1939.

with *P. kirki* and *P. clydei*, were suspected of being vectors. One species is found widely and has been found to harbour leptomonads, and to bite man. No animal host was found. In a later communication HEISCH (p. 522) shows that this new species can be infected from human lesions, and although the evidence is not complete, it seems probably to be a vector. MANSON-BAHR (p. 522) found leishmaniae in a lesion of the leg of a Kenya African with symptomless kala azar, and suggests that this lesion may represent a reaction at the site of the bite of the infecting sandfly. Early cases may evidently be infective for sandflies.

Kala azar is not common in Venezuela. PIFANO (p. 620) discusses the few cases which have been found there, and the types commonly seen in South America. He notes that *P. panamensis* is the vector of cutaneous leishmaniasis, and is found in the areas in which kala azar has been seen. VERONESI *et al.* (p. 1177) discuss the clinical features of 15 cases of kala azar observed in Brazil.

Kala azar is reported in an infant 7 months old in India; the mother had the disease in the 5th month of pregnancy, and BANERJI (p. 754) discusses the possibility of congenital infection.

In therapeutic investigations on 1,074 patients with kala azar in Uzbekistan, MIRZOYAN (p. 26) found the Russian equivalent of Solustibosan (sodium antimony gluconate) the most satisfactory drug. No instances of resistance were observed.

Aetiology: Transmission

CHAULITCH (p. 25) revives an old misconception, and claims to have seen *Leishmania donovani* in erythrocytes in stained smears of bone-marrow from patients with kala azar, but in comment Hoare remarks that the appearances, as illustrated in electron micrographs, would equally well suggest that the leishmaniae were superimposed on the erythrocytes. The same author (p. 25) also claims to have found evidence of multiple division of *L. donovani* in smears from organs of an infected marmoset; Hoare is not able to accept this explanation of the findings.

In Brazil DEANE and DEANE (p. 884) have been able to infect *P. longipalpis* with *L. donovani* by feeding the flies on an infected "wild dog" (or fox) (*Lycalopex vetulus*) which is a recently found host of some importance. *P. longipalpis* is the vector among human beings, domestic dogs and these "wild dogs".

VIVES SABATER (p. 136) found *P. perniciosus* and *P. minutus* commonly in the region of Barcelona, Spain; *P. ariasi* and *P. sergenti* were less common, and *P. papatasi* was not found.

KIRK and LEWIS (p. 1063) discuss the relationship of *Phlebotomus* species to oriental sore and kala azar in the Sudan. The evidence leading to suspicion of the vectors is epidemiological or geographical, or by the observation of the development of flagellates in the insects; experimental proof of transmission has not been obtained in the Sudan. It seems probable that *P. papatasi* is the vector of oriental sore (found along the

Nile and in Darfur and the Nuba Mountains), and *P. orientalis* and possibly *P. clydei* of kala azar (found in 4 areas south of Khartoum).

MITRA (p. 1151) reports that *P. argentipes* and *P. papatasi* have been found in large numbers in the north-western regions of Bombay State.

CUTANEOUS LEISHMANIASIS

There are 2 chief foci of oriental sore in the Department of Constantine, Algeria, one at Biskra in the Sahara, and one in Mila in the Tell; DELATTE (p. 260) reports a case in Constantine.

Observations by SHOSHINA (p. 884) on *P. minutus* var. *arpaklensis* infected with *L. tropica* suggest that transmission is effected not only by bite but also by the infective forms of the parasite, which are passed in the faeces, gaining entrance through the site of the bite, when the place is scratched.

LATÛSHEV and KRYUKOVA (p. 522) remark that cutaneous leishmaniasis does not generalize in its natural hosts (man and gerbil) but that there is a degree of viscerotropism when the parasite is introduced by an unusual route, *e.g.*, into the peritoneal cavity. They suggest that the human leishmaniae have evolved from *L. donovani* (in which viscerotropism is paramount) to *L. infantum* (in which it is less pronounced) to *L. tropica* (in which it is dormant) to *L. braziliensis* (in which it is absent). They found that injection of a reptilian flagellate into a subject who had previously been inoculated with *L. tropica* from a "moist" ulcer produced an allergic reaction, and they suggest that, in view of the genetic affinities between the various species of *Leishmania*, it is conceivable that reptilian leptomonads could be used for prophylaxis of human cutaneous leishmaniasis.

KOCHS (p. 755) has treated a large number of patients with oriental sore by means of local injections of 0.25 to 0.5 gm. of dihydrostreptomycin in 1 to 4 ml. water; as a rule not more than 3 such injections are needed, but systemic parenteral therapy may also be given as daily injections of 0.5 to 1 gm. continued to a total of 5-15 gm., rarely to 25 gm. The daily dose for children is not less than 0.5 gm. The two treatments may be used together. Results appear to be very good.

Extensive campaigns of spraying with DDT have been carried out for several consecutive years on the Adriatic coast of Italy where cutaneous leishmaniasis is known to occur; all houses and stables were treated, and CORRADETTI (p. 26) shows that the disease was virtually eliminated. For the control of oriental sore in an urban area of Azerbaidjan NADZHAROV (p. 885) found systematic spraying of dwellings and outhouses with BHC highly effective.

AMERICAN LEISHMANIASIS, ETC.

FLOCH (p. 1178) argues that in America cutaneous leishmaniasis takes 3 forms—(1) classical espundia; (2) the Mexican form usually restricted

to the ears, and chronic, with little ulceration; (3) the form found in the Guianas and Peru (*uta*) which produces cutaneous lesions, rarely extending to mucous membranes. He attributes them all to *L. tropica* but subdivides this species into the 3 subspecies—*braziliensis*, *mexicana* and *guyanensis*, respectively. In comment Hoare remarks that, if these are accepted, the Old World species becomes *L. tropica tropica*, possibly with at least 2 varieties, *major* and *minor*.

The general breeding places of tropical American species of *Phlebotomus* are not known, but FORATTINI (p. 27) produces evidence that they may breed in piggeries and have been observed sucking the blood of domestic pigs. He (p. 261) describes observations on a large number of *Phlebotomus*, of 11 species, in part of Brazil; *P. intermedius* was the most common, *P. whitmani* and *P. pessoai* were less so.

Primary lesions of American leishmaniasis were observed in the genital and peri-anal regions of two female children by GUIMARÃES and SILVA (p. 1064). They recovered on treatment with Glucantime.

JAFFÉ (p. 962) gives a general account of nasal leishmaniasis in Panama, and reports 8 cases; most of them responded to antimony in the form of stibophen given in 10 injections on alternate days, the course being repeated after an interval of a month or more, if necessary.

Verrucose dermatitis was observed by CALERO and TAPIA (p. 961) in a patient who had been cured of a typical leishmanial ulcer (in Central America). The clinical features resembled the forms seen in post-kala-azar dermal leishmaniasis, and the condition was cleared on treatment with tartar emetic.

Glucantime has been used for American muco-cutaneous leishmaniasis, but FLOCH (p. 885), who used it in 2 cases, concludes that it is no better than other antimonials, and must be given daily in doses up to the limit of tolerance. In comment Schneider considered that the efficacy of the drug could not be judged on these cases. Lomidine was used for muco-cutaneous leishmaniasis by CORRÊA and BRITO (p. 886), with apparent success. The daily dose was 125 mgm. in solution injected intramuscularly each day for 10 days, and this course was repeated twice, with intervals of 10 days between the courses.

In a forested part of Brazil where muco-cutaneous leishmaniasis was prevalent a DDT campaign of house-spraying has been carried out for some years, and NERY-GUIMARÃES and DE BUSTAMANTE (p. 27) show that the disease has been suppressed. *Phlebotomus intermedius*, a semi-domestic species, is not now found in houses, though easily found out of doors. The action of DDT may have been repellent rather than lethal, but it was successful.

ADLER and HALFF (p. 1064) describe their observations on *L. enriettii*, the South American parasite of guineapigs.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

DE JONG, C. & KRAAN, H. Een autochthoon geval van malaria bij Eindhoven. [**An Autochthonous Case of Malaria in Eindhoven, Netherlands**] *Nederl. Tijdschr. v. Geneesk.* 1956, Feb. 11, v. 100 (i), No. 6, 402–7.

The English summary appended to the paper is as follows:—

“In an autochthonous case of malaria near Eindhoven *P. vivax* was detected bearing a certain resemblance to *vivax* parasites found in a patient, who acquired malaria after blood-transfusion from a Korea volunteer. A healthy carrier, the probable source from which the patient derived his infection, was detected in the person of a Korea volunteer in a barrack in the vicinity of a freshwater breeding place of *A. maculipennis atroparvus*. Other possible sources of infection could be excluded. Data are given concerning healthy carriers returning from overseas territories in 1953 and 1954.”

JEFFERY, G. M. & RENDTORFF, R. C. **Preservation of Viable Human Malaria Sporozoites by Low-Temperature Freezing.** *Exper. Parasit.* New York. 1955, Sept., v. 4, No. 5, 445–54. [13 refs.]

After pointing out a number of advantages in the preservation of sporozoites of human malaria parasites for purposes of malaria therapy (*e.g.*, the fact that they represent the resting stage, their small size and freedom from host cells), the authors describe a method for their preservation by freezing, and compare the results with those obtained with blood stages of these parasites.

The sporozoites were obtained from mosquitoes infected with 3 species of parasites as follows: *Plasmodium vivax* in *Anopheles quadrimaculatus*, *P. ovale* and *P. falciparum* in the same species and in *A. albimanus*. The salivary glands of infected mosquitoes were teased up, freed of foreign material, and washed in sterile saline, after which they were pooled in a drop of plasma, serum or saline. The pooled gland suspension was then collected in a syringe and transferred to a 2 or 5 cc. rubber-stoppered serum ampoule, which was immersed into a mixture of 95 per cent. ethyl alcohol and ice at about -78°C . The ampoules, in suitable labelled receptacles, were stored in a cabinet containing solid CO_2 , whereby a constant temperature below -70°C . was maintained. When required for testing, the ampoules were rapidly thawed in a water bath at $45\text{--}50^{\circ}\text{C}$., after which the material was inoculated intravenously into paretic patients. For the preservation of blood parasites, 2–10 cc.

amounts of citrated blood were placed in 5-20 cc. ampoules, and the procedure was as described above.

The results of the experiments are given in a number of tables. It was found that sporozoites of the human *Plasmodium* remained viable and infective to patients after deep-freeze preservation (under $-70^{\circ}\text{C}.$) for periods up to 375 days, which was the longest period of observation. As regards the asexual stages (which included *P. malariae*), when similarly preserved they retained their viability and infectivity up to 404 days.

It is concluded that the freezing of both sporozoites and blood forms provides a satisfactory practical method for the preservation of the parasites outside the host. In both cases the parasites should be numerous and suspended in serum or plasma. C. A. Hoare

JEFFERY, G. M. & EYLES, D. E. **Infectivity to Mosquitoes of *Plasmodium falciparum* as related to Gametocyte Density and Duration of Infection.** *Amer. J. Trop. Med. & Hyg.* 1955, Sept., v. 4, No. 5, 781-9, 3 figs.

Two New World strains (South Carolina and Panama) of *Plasmodium falciparum* had been shown by the authors [this *Bulletin*, 1952, v. 49, 480; 1954, v. 51, 762] to be exceptionally long-lived in the human host, surviving for a maximum of 480 and 503 days, respectively. The infections were tested for infectivity to mosquitoes (*Anopheles quadrimaculatus* and *A. albimanus*). In general, the number of mosquitoes which became infected was directly proportional to the number of gametocytes; as a rule the Panama strain gave rise to more oöcysts than the South Carolina. Early in the disease the gametocytes, though numerous, were non-infective; this period lasted usually from 2 to 4 days. The next 30 days were the most productive, infection rates in the mosquitoes reaching 98 per cent.; then infectivity of patients with the South Carolina strain declined more rapidly than the Panama. Late in the disease, even though gametocytes might be very scanty (less than 10 per cmm.), mosquitoes still became infected, but particularly after the recurrent appearance of gametocytes. The last batch became infected on the South Carolina strain on day 321, and on the Panama on day 410.

It is pointed out that the presence in a population of people with asymptomatic intermittent parasitaemia may be highly dangerous because such cases are often undetectable in mass surveys. P. C. C. Garnham

SENEVET, G. & ANDARELLI, L. A propos de *Anopheles algeriensis*. [*Anopheles algeriensis*] *Arch. Inst. Pasteur d'Algérie*. 1955, Sept., v. 33, No. 3, 269-72, 1 fig.

After discussing the wide distribution of *Anopheles algeriensis* the authors draw attention to the fact that the dorsal plaques (tergal plates)

of the larva may be used to help to distinguish this species from *A. claviger*, *A. marteri* and *A. plumbeus*. The plaques are figured and a limited key is given for the identification of larvae of *Anopheles* species found in North Africa.

H. S. Leeson

GILLIES, M. T. **The Density of Adult *Anopheles* in the Neighbourhood of an East African Village.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1103-13, 1 fig. [13 refs.]

The density of *Anopheles gambiae* and *A. funestus* in the area of the East African village of Tengi was assessed by space-spraying all the houses. Reasons are given, based on several of the author's recent papers [see this *Bulletin*, 1953, v. 50, 903; 1954, v. 51, 1032, 1218, 1219], for accepting this method as a sound basis for estimation at Tengi. Details of the routine adopted over 12 days are given. No rain fell during this time and a relative increase in the *A. funestus* over the *A. gambiae* catches occurred during the period. Of 27,719 mosquitoes caught, 11,157 were freshly fed females of *A. gambiae* and *A. funestus*, giving a density of 35.2 fed females per head of population. It is estimated that there were 41 female *A. gambiae* and 39 female *A. funestus* per acre, with 14.9 and 13.7 females, respectively, resting outdoors. By means of other data from an experimental hut in the area, seasonal fluctuations are calculated to range from 2 to 48 female *A. gambiae* and 0.5 to 78 female *A. funestus* per acre.

The estimates are thought to be within 25 per cent. of the true densities; at most, an error of 50 per cent. is admissible.

In an interesting discussion it is noted that the transmission of malaria at Tengi is maintained at a high level by small densities of mosquitoes compared with densities estimated for other anophelines in America. Of other points of interest, it is emphasized that the difficulty experienced by the author, as well as by numerous other experienced entomologists in Africa, in finding these African vectors at rest outdoors now seems explicable as due, in fact, to a dearth of mosquitoes outdoors (30-40 females distributed over an acre, or one female in 100 square yards). This at least applies to conditions at Tengi in the East African coastal zone of Tanganyika.

D. S. Bertram

BHATIA, M. L. **Anthropophilic Index of a *A. culicifacies* and its Rôle in determining Original Home of the Species.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1955, Sept., v. 3, No. 5, 170-74. [14 refs.]

An examination of the published results of precipitin tests on the blood meals of *Anopheles culicifacies* shows that the species is predominantly zoophilic. It also suggests that the percentage of human

blood-fed specimens varies inversely with the proportion of cattle in each village and also with the density of the *A. culicifacies* population in an area; but the resting places of the mosquito seem not to be of such importance in this connexion as was previously believed.

Since the index recorded from Northern Thailand is very high and those from Delhi and Pattukottai are the lowest, it is thus concluded, according to GABALDON's theory [this *Bulletin*, 1952, v. 49, 1027], that the original home of *A. culicifacies* is somewhere in India between Delhi and Pattukottai.

H. S. Leeson

WAHI, P. N. & TANDON, H. D. **Malarial Hepatitis.** *J. Indian Med. Ass.* 1955, Dec. 1, v. 25, No. 13, 507-11, 6 figs. [18 refs.]

The authors examined material obtained by liver biopsy in 34 cases of "malaria" only 21 of which had parasites in the peripheral blood [species of parasite not stated].

Various histological changes were noted, including "reticulo-endotheliosis", diffuse or focal parenchymal damage and some portal cellular infiltration. There was no evidence of hepatic cirrhosis.

The literature is briefly reviewed.

[It is not possible from the text of this paper to determine whether the histological pictures described were found among the 21 proved malaria cases or not. The findings are thus of little value as they stand.]

B. G. Macgraith

PARROT, L. Sur l'"immunité" dans les paludismes. ["Immunity" in Malaria] *Arch. Inst. Pasteur d'Algérie.* 1955, Sept., v. 33, No. 3, 223-5.

The author discusses the immunological terminology, with special reference to its application in malarial infections of man and lower animals. He emphasizes the distinction between true immunity, which follows an infection and persists after the parasites have disappeared, and premunition, which is co-existent with the infection and is lost after the disappearance of the parasites. However, some authors believe that, in malaria, premunition may lead to residual immunity after the elimination of parasites from the host. Against this view the author advances two arguments: (1) that none of the tests employed for the demonstration of the absence of parasites (*viz.*, microscopic examination, isodiagnosis, splenectomy, challenge by re-inoculation, animal tests) provides conclusive evidence of "sterilization"; and (2) that, after the elimination of the parasites themselves, their antigens—with corresponding antibodies—may still persist in the host and protect it for some time afterwards.

It is suggested that immunity of this type should be known as "residual premunition".

C. A. Hoare

RAYMOND & PUJOL. A propos d'un cas de sympathose palustre grave. [A Severe Lesion of the Sympathetic System during the Course of Malaria] *Maroc Méd.* 1955, July, v. 34, No. 362, 913-14.

A French non-commissioned officer aged 31 returned to Morocco, after 2 years in Indo-China, with a circulatory affection of the hand resembling Raynaud's disease. Quite suddenly he developed a spasm of both femoral arteries which recurred frequently for two weeks and resisted treatment. He had several bouts of fever and after negative blood examinations every day for 14 days a few *P. falciparum* were eventually found in a blood film. After a week of anti-malarial treatment the condition resolved rapidly. The author refers to the case of gangrene of the foot in a patient with *P. falciparum* malaria reported by LEO [this *Bulletin*, 1938, v. 35, 262]. The pathology of the present condition remains obscure: an allergic origin is suggested and on this supposition appropriate treatment should be added to the anti-malaria therapy.

H. J. O'D. Burke-Gaffney

GILBERTSEN, A. S. & BASHOUR, F. Use of Malaria Therapy in the Nephrotic Syndrome. *J. Amer. Med. Ass.* 1956, Jan. 7, v. 160, No. 1, 25-30, 2 figs. [Refs. in footnotes.]

Six patients in the nephrotic stage of chronic glomerulonephritis (5 with hypertension, 1 with azotaemia), were inoculated with *P. vivax* intravenously. Clinical malaria developed in 1 to 9 days in 5 patients and was terminated by chloroquine after 4 to 13 paroxysms. The sixth patient did not develop malaria.

In two patients malaria was followed by diuresis and complete clinical and chemical remission. One of these patients has remained well for 17 months; in the other the nephrotic syndrome relapsed after 20 months. Clinically the third patient responded well, but chemically the response was incomplete, and he relapsed after 3½ months. A fourth patient progressed to complete remission for 11 months. A patient with uraemia did not respond.

In the successful cases induction of malaria was followed by diuresis; loss of oedema, decrease or disappearance of proteinuria, increase in serum albumin and relief of hypertension. The authors consider malaria therapy "particularly valuable in those patients with hypertension who are unsuitable candidates for steroid therapy". Uraemia is probably a contraindication.

B. G. Maegraith

JEFFERY, G. M. Relapses with Chesson Strain *Plasmodium vivax* following Treatment with Chloroquine. *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 1-13, 2 figs.

Previous accounts of the relapse pattern of the Chesson strain of *P. vivax* have related to infections in which treatment was instituted early

in the attack. In the work now reported the subjects, who were white patients suffering from neurosyphilis, were allowed to experience as many peaks of fever as their physical condition or other considerations would allow.

A group of nearly 100 patients were inoculated by mosquito bite with the Chesson strain of *P. vivax*, and 83 primary attacks and 101 relapses were thereby induced. The treatment regimens adopted were (1) chloroquine diphosphate 1.5 gm. base orally over 3 days, and (2) chloroquine hydrochloride 0.4 gm. base intramuscularly in a single dose.

The clinical attacks responded rapidly with both these regimens. Relapses occurred in all primary cases which were followed up for a sufficiently long period. Twenty-five out of 30 first relapses showed renewed activity after treatment, as did 17 out of 19 second relapses, 7 out of 10 third relapses and 2 out of 4 fourth relapses. One of the fifth relapses also showed renewed activity.

As was to be expected, relapses occurred later and less frequently after treatment of extended clinical attacks than was the case in those treated early as reported by other observers.

In those treated with 1.5 gm. of chloroquine base orally, the period between treatment of the primary attack and the first relapse varied from 43 to 380 days, with a median of 94 days. In those treated with 0.4 gm. chloroquine base intramuscularly, the corresponding interval was 37 to 145 days, with a median of 86 days.

The results indicate that in the Chesson strain of *P. vivax* there is extreme variability in patterns of infection and relapse, and that the treatment-relapse interval is a function of immunity rather than of dosage, excretion rate of drug, or quantum of infection [this *Bulletin*, 1951, v. 48, 518].

G. Covell

FUHRMANN, G. & KOENIG, K. Untersuchungen über die Resorption und Ausscheidung der oral anwendbaren Resochin (Chloroquin)-Salze. [Studies on the Absorption and Excretion of Chloroquine Derivatives given by Mouth] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Dec., v. 6, No. 4, 431-7, 6 graphs.

The English summary appended to the paper is as follows:—

“In eight healthy subjects the renal excretion of chloroquine derivatives following oral administration was investigated and the results were used as a yardstick to compare the absorptions. The five chloroquine derivatives studied were as follows: I = chloroquine diphosphate, II = free chloroquine base, III = chloroquine tannate, IV = chloroquine methylene-bis- β -hydroxynaphthoate, V = chloroquine sulphate. The studies showed that no decisive difference in absorption exists between chloroquine diphosphate, chloroquine sulphate, and chloroquine methylene-

bis- β -hydroxynaphthoate, but that the absorption of the free base and specially that of the tannate are much less.

“As can be seen from the tables ‘Total Excretion’ and ‘Average Excretion’ and from the graphs, the absorption of chloroquine diphosphate is the most complete. If the absorption of chloroquine diphosphate is taken as 100%, then chloroquine sulphate and chloroquine methylene-bis- β -hydroxynaphthoate have an absorption of approximately 90%, the free chloroquine base of 77% and chloroquine tannate of 66% of that of the diphosphate. It may therefore be seen that the water solubility of the chloroquine derivatives is not the only deciding factor for their absorption, for chloroquine methylene-bis- β -hydroxynaphthoate, in spite of its poor solubility, has practically the same absorption as chloroquine sulphate. This hydroxynaphthoate salt belongs to the group of well absorbed chloroquine salts and is suitable for use when a tasteless form of chloroquine is required.”

SMITH, C. C. **Metabolism of Pentaquine in the Rhesus Monkey.** *J. Pharmacol. & Exper. Therap.* 1956, Jan., v. 116, No. 1, 67-76, 4 figs. [15 refs.]

ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE. LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE. Information and Advisory Service. 1956, Feb., Bull. No. 2, 16 pp. [Originally issued Nov. 1949, revised Feb. 1953.] **Anti-Malarial Drugs.**

This brochure, first issued in 1949 [this *Bulletin*, 1950, v. 47, 201] and revised in 1953, has now undergone a second revision, rendered necessary by recent developments in the chemotherapy of malaria.

Each of the anti-malarial drugs in common use is considered separately and its effects on clinical attacks, value in prophylaxis and degree of toxicity are set out in tabular form. At the end of the brochure modern methods of treatment and prophylaxis of malaria are conveniently summarized. The revised edition of this useful and informative bulletin will be universally welcomed.

[In the section on pyrimethamine it is noted that this drug “is also tasteless and therefore ideal for children”. In point of fact the tablets have a faint but definite flavour which in some cases makes them actually attractive to children. Several instances have been reported of children consuming a number of tablets with alarming and sometimes fatal results [this *Bulletin*, 1955, v. 52, 507]. It is suggested that in future editions of the bulletin a warning be inserted to the effect that bottles or tins containing pyrimethamine should invariably be kept in some place where children cannot reach them.]

G. Covell

COLBOURNE, M. J., with the assistance of E. M. A. SOWAH. **Does Milk Protect Infants against Malaria?** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 82-90, 1 fig. [12 refs.]

Rats on a purely milk diet are protected against *Plasmodium berghei*, but this protection is lost if the animals receive para-aminobenzoate [this *Bulletin*, 1954, v. 51, 538]. Yeast is a rich source of this substance. This paper reports an attempt to find out if these factors operate similarly in human malaria. Fifty-five children, born in Accra, Gold Coast, were studied for periods up to 6 months, during which time they were all predominantly breast-fed. Each week thick and thin blood films were examined for malaria parasites. Half the children received a supplement of yeast daily and half a supplement of cod-liver oil. Several children fell out of the investigation, but of 17 who reached the age of 6 months, while receiving yeast, 12 developed malaria: of the 22 children receiving cod-liver oil, 11 developed malaria. The authors demonstrated that the children were freely exposed to infected mosquitoes and consider that they did not become infected as frequently as might be expected [this *Bulletin*, 1953, v. 50, 596]. Possible explanations for this are discussed. [Clearly the factors determining malarial infection in infants are manifold. These observations, though well planned and carefully carried out, are not sufficient to answer the question posed.] *R. Passmore*

NOTE

In the Summary of Recent Abstracts, this *Bulletin*, 1955, v. 52, 323, the comment is made that the dose of paris green used by ARAGÃO for the destruction of Bromeliads (2.5 gm. per square metre) was high. [See also this *Bulletin*, 1954, v. 51, 19.] Dr. Aragão writes to say that this dose is not high, in comparison with doses of copper sulphate used in similar work, which are very variable, depending on the type of forest treated.

CHAKRABARTI, A. K. **Studies on *Plasmodium berghei* N. SP. Vincke and Lips, 1948. XXI. Administration of an Extract of Male Sex Hormone to Orchidectomised and Non-Orchidectomised Albino Rats with Blood-Induced Infection and its Effect on the Course of Infection in its Different Stages.** *Indian J. Malariology.* 1955, Sept., v. 9, No. 3, 177-83. [13 refs.]

It has been suggested by some observers that the higher susceptibility of young animals to parasitic infections, compared with the resistance of adult animals, is related to sex hormones.

In order to verify this supposition, the author studied the course of infection with *Plasmodium berghei* in orchidectomized and intact rats, as well as in both groups after parenteral administration of male sex

hormone. The 37 animals used in the experiments were all inoculated intraperitoneally with 1×10^6 parasites and divided into 4 groups, in two of which the rats were subjected to bilateral orchidectomy, while in the other two they remained intact; furthermore, within each group one batch was treated with Testandrone, while the other served as control.

The results are given in 4 tables and their significance is discussed. It was found that in castrated male rats the daily and peak parasitaemia was higher than in infected intact rats. The role of the male sex hormone on the course of the infection was also demonstrated by the fact that in orchidectomized rats administration of both heavy and normal doses of Testandrone checked parasitaemia. However, in intact rats normal doses of the hormone promoted parasitaemia, while heavy doses inhibited it. This effect is thought to be due to impairment of normal testicular function by administration of Testandrone, leaving—in the case of heavy doses—some free hormone which inhibits parasitaemia.

C. A. Hoare

SERGEANT, Ed. & PONCET, Alice. Étude expérimentale du paludisme des rongeurs à *Plasmodium berghei*. II. Stade d'infection latente métacritique. [**Experimental Study of Rodent Malaria due to *Plasmodium berghei*. II. Latent Metacritical Infection**] *Arch. Inst. Pasteur d'Algérie*. 1955, Sept., v. 33, No. 3, 195–222, 5 graphs.

The majority of rats inoculated with *Plasmodium berghei* recover from the acute primary attack, after which the parasites are not detectable in the peripheral blood. The present paper describes experiments, the object of which was to determine whether the infection in rats assumes a latent course. For this purpose, (1) in all the infected rats, which died naturally, a careful microscopic examination was made of stained blood films and tissue smears; and (2) rats, which had recovered from the primary attack and were in apparently good health, were killed at different intervals and subjected to the "infection test", for the detection of parasites: (a) by microscopic examination of the blood and tissues [as in (1) above], and (b) by subinoculation of clean rats and mice with maximum amounts of the donor's blood and of its teased-up organs.

The results of this study, which are described in great detail, with graphs and tables, were as follows. Of 145 rats, which died from 2 to 28 months after inoculation of *P. berghei* and whose blood and tissues were examined microscopically, 15 (10.3 per cent.) revealed the presence of parasites. Of 25 rats, killed from 1 to 10 months after inoculation and subjected to the "infection test", 8 or about one-third proved to be carriers of the infection. A statistical analysis of the two methods of investigation showed that direct microscopical examination produced positive results only in one-tenth of cases, compared with one-third obtained by the "infection test". In general the respective value of the two methods was proportional to the amounts of blood and tissues that

could be examined. However, the results left no doubt about the existence of a latent infection in rats after their recovery from the primary attack [this is the condition to which the term *infection latente métacritique* is applied]. In addition, it has previously been shown that infection of rats with *P. berghei* may run a latent course from the very beginning, i.e., without any acute attack [this is described as *infection latente d'emblée*].

The duration of the metacritical latent phase may vary considerably: the longest period observed was 19 months, when parasites were detected in the bone-marrow and kidney of a rat which died naturally. In the case of 23 rats with a latent infection, subinoculations were made into 325 clean animals, whose blood and tissues were thoroughly examined, but infections were detected only in 182 (56 per cent.), indicating that in latent infections the parasites are unevenly distributed in the tissues. Hence it follows that a positive result of the "infection test" provides absolute evidence of infection, whereas a negative result is inconclusive.

It is noted that, in spite of their scantiness, the parasites derived from a latent infection exhibit a higher degree of virulence for recipient animals than the large numbers inoculated from donors during the acute attack.

[For the first part of this study, see this *Bulletin*, 1956, v. 53, 405.]

C. A. Hoare

VON BRAND, T. & MERCADO, Teresa I. **Quantitative and Histochemical Studies on Glycogenesis in the Liver of Rats infected with *Plasmodium berghei*.** *Exper. Parasit.* New York. 1956, Jan., v. 5, No. 1, 34-47, 6 figs. [16 refs.]

The authors have already indicated that there is a reduction in the synthetic power of the liver in starving rats infected with *P. berghei* when given glucose [this *Bulletin*, 1954, v. 51, 1039]. They have continued these investigations using pentoses, hexoses, heptoses, disaccharides and a trisaccharide as well as the amino-acids glycine and glutamic acid. Male and female rats about 6 weeks old were used. In one series the amount of glycogen synthesis taking place in *P. berghei*-infected and control rats was determined after oral administration of the above sugars in 1 ml. amounts of a strong solution given after 24 hours' starvation. Only the heptoses appeared to cause an upset which was characterized by diarrhoea. Three hours later the amount of glycogen in liver was estimated.

In another series of animals the formation of glycogen was studied histochemically in sections about 7 μ thick following administration of fructose or glucose. Control sections in which glycogen had been removed by diastase were studied at the same time, and also sections from starved infected and starved control rats. It was found that certain sugars did not produce an increase in liver glycogen in control or infected animals.

The results in these animals showed close correlation. Photomicrographs of liver sections clearly indicate the absence of deposition of glycogen in starved rats which is so easily demonstrated in glucose or fructose-fed animals. Significant differences in the distribution of glycogen in the liver of infected and control animals were observed.

The results of these experiments confirmed earlier work that pentoses and heptoses are not conducive to the laying down of glycogen in the liver. This failure to lay down glycogen was due to deficient liver function rather than failure to absorb sugar. The route by which the sugars were administered had some effect on the results. The presence of malaria infection also influenced the rate and site at which glycogen was deposited, at any rate in the case of some of the sugars.

J. D. Fulton

GREENBERG, J. & BOND, H. W. **Further Studies on Cross-Resistance between Pyrimethamine and Related Compounds.** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 14-18, 1 fig.

In a previous communication [this *Bulletin*, 1955, v. 52, 16] the authors showed that a strain of *Plasmodium gallinaceum* made 64-fold resistant to pyrimethamine was 2-fold resistant to certain analogues of the drug and up to 512-fold resistant to others.

In the experiments now recorded the same strain of parasite was used, but this had since become more than 800-fold resistant to pyrimethamine by exposure to increasing amounts of the drug. Resistance against several other 2,4-diaminopyrimidines, proguanil and a diaminotriazine was found to have increased significantly, although the exact degree of resistance could not be determined because the compounds (with one exception) had no effect on the parasites at the highest dose tolerated by the chicks.

In general it appears that as parasites become more resistant to one member of an analogous series, they are more likely to become resistant to related compounds. The authors note, however, that a number of points remain as yet unexplained, especially the lack of proportional increase in resistance throughout the gradient curve. Several theories which may have a bearing on this highly complex problem are examined and discussed.

G. Covell

HUGHES, F. W. & TATUM, A. L. **The Effects of Hypoxia on Infections with *Plasmodium cathemerium*.** *J. Infect. Dis.* 1955, Nov.-Dec., v. 97, No. 3, 231-7, 2 figs.

The second author and GAJEWSKI have shown previously that latent malaria infections can be rendered patent by subjecting the hosts to lowered oxygen tensions [this *Bulletin*, 1945, v. 42, 92]. The present

authors were led to study the effect of hypoxia on *P. cathemerium* infections in canaries, and the manner in which it affected chemotherapy. The strain of parasite has been maintained unaltered since 1940 in canaries during blood passage. Reduced oxygen tension was obtained by use of a steel chamber and the birds were subjected to alternate light and dark periods of 12 hours. The course of infection was followed in stained blood films.

It appears from earlier work that hypoxia reduces acquired immunity. After normal birds had been maintained at a partial pressure of 75 mm. oxygen for 2-3 days they were brought out of the chamber and infected intravenously with 5,000 malaria parasites, followed immediately by treatment with primaquine at different dosage levels intravenously. They were then returned to the low-pressure chamber. Control birds were kept at normal pressure and others untreated were maintained at the low oxygen tensions. It was found that a few days in the atmosphere with reduced oxygen tension reduced the activity of the drug. After periods of 16 days in the chamber birds showed only moderate acclimatization to the reduced oxygen pressure and the drug in these cases was only one-third as effective as under normal conditions. On the other hand, 4 days after removal from the chamber their adaptation to normal conditions appeared to be complete. The effect of cortisone on lowering the efficacy of defence mechanisms was also tried. It appeared that the course of infection after cortisone treatment resembled that in birds subjected to low oxygen tensions. The oxygen-deficient atmosphere possibly depressed the activity of phagocytic mechanisms in the host. There was a striking rise in the amount of primaquine required to cure infections under these conditions. The effect of hypoxia on acquired immunity noted above appears to resemble closely its effect on natural immunity.

J. D. Fulton

SOBERÓN Y PARRA, G. & PEREZ REYES, R. **The Activity of Primaquine-Pyrimethamine (Daraprim) Combinations against *Plasmodium relictum* in Pigeons.** *J. Protozoology*. Utica. 1956, Feb., v. 3, No. 1, 43-5. [13 refs.]

Because the 8-aminoquinolines such as pentaquine, isopentaquine and primaquine show only moderate activity against asexual forms of malaria parasites and possess chiefly gametocidal properties, they have often been used clinically in combination with other drugs. Toxic effects are frequently encountered. In monkey malaria SCHMIDT and GENTHER [this *Bulletin*, 1953, v. 50, 480] have reported that combinations of pyrimethamine and primaquine had similar activity to that of quinine and primaquine.

In the present investigation 23 pigeons were infected intravenously with *P. relictum*. Oral treatment with different combinations of the two drugs began 2 days after inoculation and continued twice daily for 5 days. The

course of infection was followed in stained blood films. Clearance of parasites from the peripheral blood occurred much more rapidly and for longer periods than with any other drug combination. The authors consider that this was due to the effect of the drug combination on exo-erythrocytic forms. It is suggested that the combination of the two substances pyrimethamine and primaquine may have advantages in treatment of human malaria.

J. D. Fulton

CHAO, J. & BALL, G. H. **Quantitative Microinjection of Mosquitoes.** *Science*. 1956, Feb. 10, v. 123, 228-9, 2 figs.

An apparatus suitable for the injection of 0.61 mgm. of fluid into mosquitoes is described and illustrated. Injections of *Culex tarsalis* were done with canary blood heparinized or citrated (with and without glucose) and infected with *Plasmodium relictum*. Glass needles drawn to 10 to 90 μ in diameter caused little or no mortality when injections were made at the metacoxae. The insects were held upside down on a glass pipette by suction and brought towards the stationary needle. Of 73 out of 322 females injected and 5 of 118 males which survived 14 days, none showed by dissection development of oöcysts free in the haemocoel. This differs from results with *P. gallinaceum* injected into *Aedes aegypti* [this *Bulletin*, 1955, v. 52, 612]. In the present studies, the blood used was proven by feeding to mosquitoes to be infective but the nature of the work did not call for final tests of the infectivity of the injected mosquitoes by histological examination or test feeds.

D. S. Bertram

GLENN, S. & MANWELL, R. D. **Further Studies on the Cultivation of the Avian Malaria Parasites: II. The Effects of Heterologous Sera and Added Metabolites on Growth and Reproduction in vitro.** *Exper. Parasit.* New York. 1956, Jan., v. 5, No. 1, 22-33, 8 figs.

Attempts have been made to culture the small avian parasite *P. hexamerium* and also *P. elongatum*, both of which normally infect passerine birds, in synthetic medium as an aid to chemo-therapeutic studies [this *Bulletin*, 1951, v. 48, 335; 1953, v. 50, 685]. Information was also sought as to whether the latter parasite, normally showing schizogonic activity in bone-marrow, could be induced to multiply to a greater extent in red cells. The replacement of the chick host plasma by that of turkey and pigeon was tried as well as the addition of vitamin B12, folic acid or a coenzyme concentrate containing especially coenzyme-A, to the basic Harvard culture medium [*ibid.*, 1945, v. 42, 867].

The success of the culture experiments was judged by growth and multiplication, staining characters of the infected cells and the ability to infect duckling hosts while taking note of the length of the prepatent period. It was found that turkey plasma, but not pigeon plasma, was

beneficial to growth of *P. hexamerium*. The vitamins were on the whole beneficial. Vitamin B12 prevented haemolysis. Whereas Daraprim [pyrimethamine], an antagonist of folic acid, was previously found to possess little activity against *P. hexamerium in vivo* [*ibid.*, 1954, v. 51, 1146], it has now been found, paradoxically enough, that folic acid is beneficial for *in vitro* growth. As TRAGER found for *P. lophurae* [*ibid.*, 1955, v. 52, 255], coenzyme-A has also proved an aid to growth of *P. hexamerium*. Whereas the present growth studies furnished better results than those previously obtained [*ibid.*, 1953, v. 50, 685] it does not appear that much progress has yet been made in this field. The authors believe that a tissue phase occurs during asexual reproduction of *P. elongatum*.

J. D. Fulton

BLACKWATER FEVER

Theron, H. F. **Blackwater Fever in an African Child.** *Central African J. of Med.* 1955, Sept., v. 1, No. 5, 220.

“A case of blackwater fever in an African child, aged 3½ years, living in an endemic malarial district, is described.”

VAN RIEL, J. & SZPAJSHENDLER, L. Fièvre bilieuse hémoglobinoïdique et leptospirose. [**Blackwater Fever and Leptospirosis**] *Ann. Soc. Belge de Méd. Trop.* 1955, Feb. 28, v. 35, No. 1, 93–107, 2 charts. [32 refs.]

The English summary appended to the paper is as follows:—

“Report of two cases of Blackwater Fever. In one of the cases a leptospira, apparently related to the group *hebdomadis* was isolated by haemoculture. Histological changes in the organs, observed after autopsy, are not, at any rate, inconsistent with the diagnosis of Blackwater Fever.

“In the second case, serodiagnostic was positive for *L. bataviae*.

“The authors suggest the hypothesis that an infection due to pathogenic leptospira might be, in cases of patients not in state of premunition against malaria, one of the agents responsible for haemolysis.”

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

HENIGST, W. Aussergewöhnliches Verhalten eines *Trypanosoma gambiense*-Stammes in der weissen Maus. [**Unusual Behaviour of *Trypanosoma gambiense* in Mice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Oct., v. 6, No. 3, 361–8 [24 refs.]

When maintained in mice, *Trypanosoma gambiense* usually reproduces by binary fission every 6 hours, as determined by the duplication of the number of trypanosomes present in the blood after this period. It has also been calculated that the death-point of the animal is reached when the number of trypanosomes rises to 1,420,000 per cmm. of blood.

In the present paper the author describes a strain of *T. gambiense*, which was isolated in 1939 and has been continuously maintained in mice at the Institute of Tropical Medicine in Munich since 1953. In this strain the number of trypanosomes in the blood was doubled every 4 hours 50 minutes, *i.e.*, reproduction occurred at much shorter intervals than in other strains. Another feature of this strain is the high parasitaemia, *viz.*, 5,250,000 trypanosomes per cmm., reached at the time of the animal's death, thus exceeding all figures recorded previously for this species. The counts upon which these data are based are given in a number of tables.

It was found that the incubation period after subcutaneous inoculation was longer than after intraperitoneal inoculation. Attempts were made to shorten the incubation period by injection into mice of cortisone or hyaluronidase with the infected blood, but without success. It is noted that, towards the end of the infection, many of the trypanosomes appeared to be degenerating and in agglomerations. The author suggests that these phenomena might be due to antibody formation in the infected mouse.

C. A. Hoare

GERZELI, G. Ricerche istochimiche ed istomorfologiche sui Tripanosomidi. (Microscopia a contrasto di fase ed interferenziale.) [**Cytochemical and Morphological Researches on Trypanosomidae (Phase-Contrast and Interference Microscopy)**] *Riv. di Parassit.* Rome. 1955, Oct., v. 16, No. 4, 209–15. [19 refs.] English summary (7 lines).

The author describes the results of a study on the biochemistry of various representatives of the Trypanosomidae. The organisms used were *Trypanosoma granulosum* from eel, *T. remaki* from pike, *T. wenyoni* from goby, *T. gambiense* and *T. brucei* from guineapig and mouse, *Crithidia inflata* from insect and *Leishmania tropica* from man. The

trypanosomes were studied in the blood of their hosts, the crithidia in the intestinal contents of the insect, and the leishmania in material from a sore. The determination of the cell constituents was based on various biochemical reactions, while their appearance was examined by phase-contrast and interference microscopy.

The results were as follows. Polysaccharides could not be detected in any of the flagellates, either by the Hotchkiss or metachromatic reactions. Lipids were found to be present, in the form of granules positive to Sudan Black B, in *T. gambiense* and *Crithidia*. The presence of nucleic acids was determined by Feulgen's reaction and other methods: in the nucleus of the flagellates they formed a peripheral ring, whereas the kinetoplast never reacted positively to Feulgen's reaction. Gallo-cyanin and pyronin revealed the presence in the cytoplasm of the flagellates of basophilic granules and also stained the kinetoplast, but after acid hydrolysis and treatment with ribonuclease all the inclusions, except the kinetoplast, disappeared. The presence of phosphatases could be detected by Gomori's alkaline phosphatase method in *T. wenyoni* and *T. gambiense*, in the form of positively stained cytoplasmic granules, but these were not seen in the other trypanosomes.

These findings are compared with those of other workers, and it is concluded that, on the whole, the Trypanosomidae show a number of common biochemical characteristics, in spite of differences in their bionomics and habitats.

C. A. Hoare

WILLETT, K. C. **A Special Method for the Dissection of *Glossina*.** *Ann. Trop. Med. & Parasit.* 1955, Dec., v. 49, No. 4, 376-83, 4 figs.

"1. A method is described for the dissection of *Glossina*, in which complete exposure of the abdominal and thoracic organs is obtained with the minimum of disturbance. The method in no way supersedes well-known earlier methods, but it is applicable where they are not and is useful on account of the full exposure obtained and the small amount of disturbance involved.

"2. It can be employed in the examination of dead tsetse-flies for trypanosome infections, and by its use living trypanosomes have frequently been found in flies believed to have died as long as 16-20 hours previously.

"3. The method is described, with notes on points of technique, in the following seven stages: (i) removal of wings and legs; (ii) opening of sides of abdomen; (iii) cutting off whole front of thorax; (iv) pinning down in wax under fluid; (v) joining lateral abdominal and thoracic incisions, removal of sterna, severance of attachments of gut and other structures in 'waist'; (vi) cutting through terga and neck (or anterior thorax dorsal to oesophagus), removal to separate slide of complete gut and abdominal contents on posterior pin; (vii) separating out gut and other required structures.

"4. A short description is given of useful modifications of ordinary dissecting-instruments which facilitate various stages of the dissection.

"5. Simplified methods are described for use in the dissection of dead tsetse-flies for trypanosome infections, one for the examination of abdominal contents only, and one for the examination of abdominal contents plus thoracic gut structures and salivary-gland ducts."

CAMBOURNAC, F. J. C. & GÂNDARA, A. F. Contribuição para a elaboração da carta de glossinas em Angola. I—Glossinas da Província do Congo. [**Contribution to an Improvement of the Tsetse Map of Angola. I. Tsetse of the Congo Province**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 329-40, 1 graph. [18 refs.] English summary (5 lines).

The authors list the following species of *Glossina* as occurring in the Congo Province of south-east Angola: *Glossina palpalis palpalis*; *G. fuscipes quanzensis* (comb. nov.); *G. schwetzi*. They base this list on a study of over 10,000 specimens collected from various localities in this area, and give the species in the order of their abundance in the collections. They follow the classification of NEWSTEAD [see this *Bulletin*, 1925, v. 22, 80] except in respect of the *palpalis* group where they use that recently propounded by MACHADO [*ibid.*, 1955, v. 52, 17].

They note that previous records of *G. tachinoides* from this area probably refer to the pale coloured variety of *G. palpalis* described as *wellmani* and they discuss previous records of other species of tsetse not encountered by them, *viz.*, *G. pallicera* (in the form of its variety *G. p. newsteadi*, following Machado); *G. brevipalpis* (which they suggest has been confused with *G. schwetzi*); *G. medicorum* (whose identity, based on external characters only, they regard as doubtful); *G. fusca* (which again they think may have been confused with *G. schwetzi*). They discuss the absence of the *morsitans* group from the area, throwing doubt on an early record of *G. longipalpis*. They conclude that the only species of tsetse in the Congo Province of Angola are the three they have identified.

W. H. Potts

CAMBOURNAC, F. J. C. & GÂNDARA, A. F. Identificação duma mancha de glossinas na margem direita do rio Cuando. [**Identification of a Belt of Glossina on the Right Bank of the River Cuando**] *Anais Inst. Med. Trop.* Lisbon. 1955, Sept., v. 12, No. 3, 309-27, 2 maps & 11 figs. [11 refs.] English summary (6 lines).

After citing a number of previous reports of tsetse flies on the River Cuando in south-east Angola the authors describe an expedition to this little frequented area to determine what species of tsetse were concerned. They confirm those previous reports which had called it *Glossina*

morsitans. No very clear indication of the extent of the belt, which lies on the River Cuando between 15 and 16° S., is given but its possible limits are discussed and the suggestion made that it is advancing northwards. Two maps show (1) the areas searched and the limits of an uninhabited area which showed signs of previous occupation and which local Africans said had been evacuated on account of "flies"; and (2) the vegetation of the area (after Gossweiler), which consists of grassy plains with scattered trees and shrubs, and ridges covered with *Berlinia-Brachystegia-Combretum* woodland. The appearance of this vegetation is shown in 9 photographs. In the survey use was made of catching screens of the type described by SWYNNERTON [see this *Bulletin*, 1937, v. 34, 363]; the identification of the flies was based on an examination of their genitalia.

W. H. Potts

LAUFER, I. **Aspects of Medical Control of Rhodesian Sleeping Sickness in Tanganyika.** *East African Med. J.* 1955, Dec., v. 32, No. 12, 465-80.

In the first section of his paper the author gives a brief account of the geography, climate, population, history (both general history and that of the medical service), and the administration of Tanganyika.

In the section on the history of sleeping sickness he mentions various authors and traces the growth of our knowledge of the disease from the first description by a European (John ATKINS) of it in 1734 to FAIRBAIRN and BURTT's work which demonstrated that strains of *T. rhodesiense* perpetuated through antelopes and sheep by *G. morsitans* were still infectious to man after 10 years.

The other main landmarks which he mentions include BRUCE's work (1903) which incriminated a trypanosome as the causal agent and tsetse as its vector; the work of KLEINE (1910) and others which showed that the trypanosome underwent a cycle of development in tsetse; STEPHEN and FANTHAM's discovery of *T. rhodesiense* as a separate species from *T. gambiense*; and TAUTE's failure to infect human beings with *T. brucei*. [CORSON's pioneer work by which it was first shown that *T. rhodesiense* could still infect a human being after passage through sheep is not mentioned.]

He points out that the introduction of sleeping sickness into a new area can usually be traced to human beings, and that symptomless carriers have been found by several workers, but that "a lot of evidence has accumulated showing that game infected with *Trypanosoma rhodesiense* can act as a potential reservoir of the disease".

A brief reference is made to the bionomics of tsetse but it is of a general nature and does not apply to all species.

The distribution, spread and control of sleeping sickness in Tanganyika are next described. The disease has occurred in 7 of the 8 provinces, and

an attempt is made in the paper to follow the lines of spread. It is estimated that the infected areas cover well over half the total area of the Territory.

Epidemics of Rhodesian sleeping sickness are most likely to occur when the density of the population is between 20 and 30 persons to the square mile. Lower densities lessen the chances of spread, and higher densities, combined as they usually are with increased bush clearing for agricultural purposes, tend to keep tsetse in check round the villages.

The main directions in which control is usually planned are (1) the breaking of contact between man and fly, *e.g.* by close settlement which keeps the growth of bush in check; (2) the destruction of tsetse; and (3) the medical control of infected persons.

In the section dealing with the disease itself, *G. morsitans*, *G. swynner-toni* and *G. pallidipes* are named as the vectors of the Rhodesian type. A description is given of the clinical course of this type of the disease and the methods of diagnosis and treatment are described. Trypanosomes are looked for in the blood, cerebrospinal fluid, and occasionally, in the glands. They may appear in the blood after an incubation period of 7 to 14 days but some cases may remain symptomless for as long as 6 weeks. They may appear in the cerebrospinal fluid about a month after the onset of symptoms but their presence is very irregular. For purposes of classification, the cell count and the protein content of the cerebrospinal fluid are used, and the cases placed—following Fairbairn's grouping—into categories of early, borderline and late. "The normal cell count is about 2-3 cells per cubic millimetre of the fluid. The normal upper limit of protein is 25 milligrammes per 100 cc. of fluid. Early cases show a maximum of 7 cells per 1 cmm. and not more than 30 mgm. of protein per 100 ccm. of fluid; such cases are curable." Borderline cases, only some of which are curable, have a maximum of 20 cells and of 35 mgm. of protein, while late cases—considered to be incurable—show over 20 cells and 40 or more mgm. of protein.

The treatment depends on the stage of the disease. For early cases, Antrypol "is given by injection in 1.0 gramme doses in a solution of 10 cc. of distilled water at weekly intervals. The doses for children are: under 3 years, 0.25 gramme, from 3-10 years, 0.5 gramme, over 10 years, adult dose of 1.0 grammes". In borderline cases the Antrypol course is followed after 7 days by a course of tryparsamide—2-3 grammes in 10 cc. distilled water once weekly for 12 weeks. This drug may cause optic atrophy and must be discontinued if there are any signs of disturbance of vision. Late cases are treated like borderline cases and then given 1.0 gramme of Antrypol at monthly intervals in order to keep their blood free from trypanosomes. Mel B and Arsobal are on trial for late cases.

Prophylaxis by means of periodic injections of Antrypol is not advised.

An alarming increase of cases occurred in Tanganyika in 1949, when 1,412 were notified, compared with 681 in 1948. After a conference held at the provincial headquarters of the Western Province in December 1949

it was decided that a campaign should begin at the worst focus of the disease (Kakonko in the Western Province), to be followed later by such measures as might be necessary. The measures to be taken in the first instance were (a) to trace all patients who had been notified in the past and to bring them under medical control; and (b) to carry out a blood slide survey of 10 to 20 per cent. of the Kakonko population who might be exposed to the risk of infection, in order to locate symptomless carriers, former known patients who had not completed treatment and persons who had not previously reported sick. To do this a team was formed, consisting of a medical officer, a settlement officer, 6 microscopists, and 7 sleeping sickness scouts. Normally the duties of the settlement officer and the scouts are the re-settlement of tsetse-infested villages, but in this campaign they were also used to trace previous sleeping sickness patients. In the survey 8,974 persons were examined (27 per cent. of the estimated population), but, excluding the previously known patients, only 3 early cases and no symptomless carriers were found.

Detailed histories were obtained from the patients who had been traced in order to find out, as nearly as possible, the place of infection and the time and place of onset; clinical examinations were made for signs of nutritional deficiency and concurrent diseases in addition to making a diagnosis of sleeping sickness; the patients were then classified into early, borderline and late and, as far as possible, given treatment appropriate to each class. In classifying the patients the "white cell count of the cerebro-spinal fluid was used as the main criterion as to the curability of the patient", since it was not possible to use protein estimation of the fluid as a routine procedure.

There is a table which shows the number of cases and deaths recorded in the country from 1922 to 1951 inclusive. Other tables give some analyses of the 1949 Kakonko cases and of the population on which the slide-survey was made.

The author makes the observation that out of 187 patients only 45 were cured, though 100 per cent. of patients recover if they begin treatment early enough and complete the recognized course.

In his discussion on the situation in Tanganyika he makes the following observations: symptomless carriers may safely be excluded as a cause of the flare-up in 1949; patients who are not completely cured form a dangerous source of infection (the difficulty is a social one because facilities for treatment exist); drought may have an important bearing on the spread of the disease because of poor nutrition, uncontrolled migration through tsetse areas in search of work, food and water, and (if too many leave) fragmentation of the safe settlements.

"Constant watch for new cases, perseverance in supervision of old cases, health education and persuasion, appear to be more important for the achievement of success than any compulsory methods based on rules and regulations which are not understood by the population and which may result in the concealment of the sick." While medical curative

control plays an important part, other measures have to be taken simultaneously, aimed mainly at decreasing the risk of exposure to infection. The new insecticides, the development schemes which involve land clearing and the construction of dams, the control of authorized migratory labour, and the possibility of finding new specific drugs may all be expected to assist in the control of the disease. *George Maclean*

CANTRELL, W. **Agglutinating Strains of Trypanosomes obtained with Oxophenarsine.** *Science*. 1955, July 29, v. 122, 200.

When mice infected with *Trypanosoma equiperdum* were treated with subcurative doses of oxophenarsine, the parasites became resistant to this drug, giving rise to strains which—when taken up in a pipette with infected blood diluted in saline (1 in 100)—agglutinated at 20°–30°C. in masses of different sizes containing hundreds of flagellates. However, when the pipette was warmed to 38°C. the clumps broke up. This tendency to agglutinate was not observed when normal strains of *T. equiperdum* were examined in saline at 4°C. After prolonged passages with increasing doses of the drug, an 80-fold oxophenarsine resistance was reached. Agglutination of the trypanosomes persisted through 8 passages, but almost disappeared by the 17th passage, when the strain became practically non-agglutinating. However, this property could be partly restored by centrifuging the diluted infected blood and infecting mice with the sediment.

The agglutinating component could be destroyed by treating infected mice with larger doses of the drug than the one which gave rise to agglutination: the relapse strains were then non-agglutinating. It was found that blood of mice freed of an agglutinating strain did not agglutinate normal trypanosomes. Agglutination of trypanosomes in drug-resistant strains could be avoided by maintaining several strains, owing to the low incidence of the agglutinating characteristic.

C. A. Hoare

VON BRAND, T. & AGOSIN, M. **The Utilization of Krebs Cycle Intermediates by the Culture Forms of *Trypanosoma cruzi* and *Leishmania tropica*.** *J. Infect. Dis.* 1955, Nov.–Dec., v. 97, No. 3, 274–9. [14 refs.]

“1. The culture forms of *Trypanosoma cruzi* and *Leishmania tropica* showed an increased respiration when the medium contained intermediates of the Krebs cycle.

“2. Direct determinations revealed the consumption of pyruvate, α -ketoglutarate, and fumarate, more substrate disappearing than corresponded to the excess oxygen consumption.

“3. Malonate inhibited strongly the endogenous respiration of both species, and this inhibition was released by succinate. It is concluded that the parasites probably have a sequence resembling the Krebs cycle.

"4. Differences between *T. cruzi* and *L. tropica* were found in the following respects: response to change in ionic environment and pH, sensitivity to impurities in pyruvic acid, content of material absorbing at 240 m μ , and release of malonate inhibition by added malate."

CORRÊA, R. R. Alguns dados sôbre a criação de triatomíneos em laboratório (Hemiptera, Reduviidae). [**Rearing of Triatominae in the Laboratory**] *Folia Clin. et Biol.* S. Paulo. 1954, July-Aug., v. 22, Nos. 1/2, 51-6, 3 figs. English summary.

For xenodiagnostic purposes, nymphs of the following species of Triatominae were reared in the laboratory: *Panstrongylus megistus*, *Rhodnius prolixus*, *Rhodnius* sp. (not named), *Triatoma infestans*, *T. rubrovaria* and *T. sordida*. The last two of these proved unsatisfactory. Nymphs were fed on chicken blood and maintained at 19-26°C. and 75-100 per cent. humidity. Precautions were found necessary against the hymenopteron *Telenomus fariari*, which frequently parasitized eggs collected in the field; and against ovipositing habits in *Rhodnius* spp., which often deposited eggs through the mosquito netting used as covering, and in *P. megistus*, which ejected eggs through this netting to distances of 18 inches. [The latter phenomenon has also been recorded in *T. sordida*, see this *Bulletin*, 1949, v. 46, 1017.]

Nymphs of *P. megistus* and of *T. infestans* were reared in narrow rectangular boxes covered with netting. These boxes were supported in groups on a stand for feeding purposes (both these structures are figured). Rearing of *Rhodnius* spp. was carried out in large glass beakers in the usual way.

A special apparatus, a figure of which is also given, was devised to collect eggs of *T. infestans*. It was supported on a stand and adult insects were enclosed between an upper perforated board, through which feeding took place, and a "floor" of wide-mesh netting. Below the latter, an inverted cloth pyramid converged on an opening leading to a glass container beneath. Eggs laid in the feeding compartment fell downwards and were collected automatically. N. R. Phillips

DA SILVA, T. L. & CORRÊA, R. R. Informes atuais sôbre a distribuição geográfica dos triatomíneos na área paulista. (Hemiptera, Reduviidae.) [**Current Information on the Geographical Distribution of Triatominae in the São Paulo Area, Brazil**] *Folia Clin. et Biol.* S. Paulo. 1954, July-Aug., v. 22, Nos. 1/2, 79-84. English summary.

Recent studies, and a survey of the literature, have recorded the following Triatominae from the State of São Paulo, Brazil:—*Panstrongylus geniculatus*, *P. megistus*, *Rhodnius* sp. (? *prolixus*), *R. domesticus*, *Triatoma infestans*, *T. oswaldoi*, *T. rubrofasciata*, *T. sordida*,

T. tibiamaculata. The counties in which these occurred, non-infected or naturally infected with *Trypanosoma cruzi*, are listed by species.

T. infestans is considered to be the principal vector of Chagas's disease in São Paulo, with *T. sordida* and *P. megistus* as secondary vectors. Infection indices for these species, as determined by the authors, were 9.5, 4.9 and 1.4 per cent. respectively. *R. prolixus* has been previously recorded positive for *T. cruzi*.

In all, of 369 counties in the State, 265 contained Triatominae. The incidence, by numbers of counties, of the vector species (incidence of infection in brackets) was *T. infestans* 251 (192), *T. sordida* 119 (67), *P. megistus* 62 (34), *Rhodnius* sp. 16 (1 suspected). N. R. Phillips

MELLO, A. & MELLO, N. R. A forma nervosa crônica da doença de Chagas. [**Chronic Neurological Form of Chagas's Disease**] *Rev. Inst. Adolfo Lutz*. S. Paulo. 1955, v. 15, 194-222, 5 figs. [Numerous refs.] English summary.

CORRÊA, R. R. & SCHIAVI, A. Resistência aos inseticidas, do *Triatoma infestans* em suas diversas fases evolutivas. [**Resistance to Insecticides of *Triatoma infestans* at Different Stages of Development**] *Folia Clin. et Biol.* S. Paulo. 1954, July-Aug., v. 22, Nos. 1/2, 57-64. English summary.

The lethal toxic action of BHC (benzene hexachloride) on *Triatoma infestans* was tested by spraying a suspension of the wettable powder, at the rate of 1.0 and 0.5 gm. of gamma isomer per square metre, on to a 2-inch layer of mud in glass dishes. Test batches of 60 triatomids, each consisting of 10 nymphs of each instar and 10 adults, were then exposed to the sprayed surfaces for 2 minutes, and subsequently observed.

Insects exposed to the insecticide 6 hours after application showed 100 per cent. mortality after 4 days for the 1.0 gm. dosage; at 0.5 gm. dosage, mortality was 68.4 per cent. after 4 days, and a maximum of 82.4 per cent. after 11 days. Of the latter, 100 per cent. of first to third instar nymphs were killed, but later-instar nymphs and adults eventually recovered.

Residual properties of the insecticide were poor after 15 days. Mortality at the 1.0 gm. dosage was 30.0 per cent. and at 0.5 gm. dosage was 18.3 per cent.; the latter percentage was derived mainly from early instar nymphs, and no adults were killed by the smaller dosage.

The authors therefore advocate using the dosage of 1.0 gm. for dwellings infested with *T. infestans*. N. R. Phillips

SENECA, H. & WOLF, A. *Trypanosoma cruzi* Infection in the Indian Monkey. *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1009-14.

In an earlier paper (SHWARTZMAN, *The Effect of ACTH and cortisone upon infection and resistance*, 1953, New York: Columbia Univ. Press,

p. 122) Wolf *et al.* briefly reported the discovery of latent *Trypanosoma cruzi* infections in rhesus monkeys. The authors now describe the isolation of a strain and compare its characters with those of South American origin. It was isolated from a rhesus monkey of Indian origin by excising 3 gm. of muscle from the site of an experimental inoculation of a brain suspension, lightly grinding the material and adding it to tubes of the Seneca haemoflagellate medium (a beef, neopeptone blood agar, plus penicillin, incubated at room temperature). At first growth was poor, but in subcultures it became rich; it was also obtained easily on Boeck-Drbohlav egg medium.

Mice 4-6 weeks old (not Swiss strain) developed a mild parasitaemia after intraperitoneal inoculation of material from a week-old culture; if the mice were given 2 doses of 2.5 mgm. of cortisone, a much heavier and fatal parasitaemia followed. *Rhodnius prolixus* and *Triatoma gerstaeckeri* were fed on an infected mouse and metacyclic trypanosomes were found in the rectal discharges 17-32 days after the initial feeding. Agglutination tests were performed with serum of rabbits immunized against various strains of the trypanosome; all showed cross agglutination and this was verified by agglutination absorption tests. Thus serologically the Indian rhesus organism appears identical with the New World species. This is confirmed by its morphology and by its cycle of development in cultures, the bug, and in the vertebrate host, where typical leishmanial clusters are found.

[Neither in this paper nor in the earlier one is the possibility of cross infection in the laboratory by bed bugs considered.] P. C. C. Garnham

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

See also p. 729, VON BRAND & AGOSIN, **The Utilization of Krebs Cycle Intermediates by the Culture Forms of *Trypanosoma cruzi* and *Leishmania tropica*.**

HOARE, C. A. **The Epidemiological Role of Animal Reservoirs in Human Leishmaniasis and Trypanosomiasis.** Reprinted from *Vet. Rev. & Annotations*. 1955, Oct., v. 1, Pt. 2, 62-8, 1 fig. [30 refs.]

This paper gives a useful summary of our knowledge today regarding the animal reservoirs of leishmaniasis and African and New World trypanosomiasis—all typical zoonoses.

Leishmania tropica ("moist" type of oriental sore) lives in the gerbil *Rhombomys opimus* in Soviet Middle Asia and Iran, and if the animal is destroyed either by agricultural development or by chemicals (chloropicrin) the disease in man disappears. However, urbanization is not always so successful, for interhuman transmission by other species of sandflies may occur and the "dry" type of disease ensues.

Leishmania braziliensis has the agouti (*Dasyprocta aguti*) as its wild host in Paraguay [this *Bulletin*, 1952, v. 49, 761] [and the paca—*Cuniculus paca*—in Brazil (see FORATTINI and SANTOS, *Rev. Clin. S. Paulo*, 1955, v. 13, 1)].

Leishmania donovani is harboured by jackals (*Canis aureus*) in Tadjikistan, and by foxes in *Dusicyon (Lycalopex) vetulus*, in Brazil [this *Bulletin*, 1955, v. 52, 884]. Increasing urbanization removes this host which is replaced by the dog, and in the Mediterranean, China and other parts (but not India) the dog is the essential reservoir.

The reservoir host of *Trypanosoma rhodesiense* and *T. gambiense* has still not been finally confirmed. It appears likely that antelopes act as the reservoir of the former, while the zoonotic aspect has largely disappeared in regard to the latter, although pigs and goats may sometimes be concerned.

Trypanosoma cruzi is chiefly harboured by armadillos (*Dasypus*) and opossums (*Didelphys*). When the infection is "domiciliated", domestic animals like dogs and cats, and probably pigs, take over.

The original hosts of *Trypanosoma rangeli* are probably monkeys (*Cebus*) and opossums (*Didelphys*), and its domestic host is the dog.

The author discusses these cycles and shows that the characteristic of the natural focus is its complete independence of man and his domestic animals, but once man breaks into the circle, the epidemiological pattern changes. The original focus may remain dormant for indefinite periods, but its existence may be recognized in PAVLOVSKY'S "landscape epidemiology" (*Manual of Human Parasitology*, 1949, Moscow, Acad. Sci. USSR) and the potential danger averted. P. C. C. Garnham

LAMBORN, W. A. **The Haematophagous Fly as a possible Vector of Leishmania.** *Bull. Endem. Dis.* Baghdad. 1955, July, v. 1, No. 3, 239-49. [15 refs.]

On the basis of considerable circumstantial evidence, supported by a small but definite amount of factual observation, the author suggests that non-piercing haematophagous muscid flies may well be incriminated as vectors of leishmaniasis in certain areas.

It has been supposed that *Leishmania* spp. pathogenic to man fail to survive in the gut of bacterially contaminated non-haematophagous domestic muscids such as *Musca domestica* and *Lucilia* spp. However, *Leishmania* has been shown to survive in other bacterially contaminated situations, and has been passed in a viable form in the faeces of *Musca*

sorbens. Non-domestic flies of the *M. sorbens* and *M. lusoria* groups are by no means uncommon in the Palearctic region, and they habitually drink blood, as well as pus and serum, at surface lesions. Since parasitaemia of the peripheral blood is of rare occurrence in cutaneous leishmaniasis, the chances of acquiring an infection are greater in a surface feeder than in a piercing fly. It is suggested that transmission is probably by mechanical contamination resulting from intermittent feeding; the principal sites of feeding are in the region of the buccal and nasal mucosa, the conjunctiva (all of which provide natural secretions attractive to the flies), and at lesions produced by piercing muscid and tabanid flies. Suggested sources of initial infection in oriental sore, and espundia, are man and the horse, but probably not small mammals as in the case of *Phlebotomus*. In kala azar, infection probably occurs from contaminated human mucus and faeces, on which the flies feed before oviposition; subsequent contamination of foodstuffs may then bring about transmission.

Attempts to achieve infection of laboratory-bred flies with *Leishmania tropica* succeeded only in a single instance; here leptomonads were recovered on the tenth day after feeding at an infected lesion, and pathological changes in the salivary glands were evident. Other failures were attributed to lack of infecting forms of the parasite (in the case of tube cultures) and to the possibility that only certain (undetermined) muscid species act as definitive hosts.

N. R. Phillips

MONSUR, K. A. **Alcoholic Extracts of Kedrowsky's Bacillus as Antigen for Complement-Fixation Tests in Kala-Azar.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 91-6.

A new method is described for preparing antigen from an acid-fast bacillus (Kedrowsky's) for use in the diagnosis of leishmaniasis by complement fixation [this *Bulletin*, 1947, v. 44, 189]. This test has by now proved its usefulness. The author's claim of greater simplicity in technique without loss of sensitivity is probably a just one, since even simpler procedures than his can give results equal to those of the Witebsky-type antigen, which is laborious to make but happened to be first in this field. Cross-fixation with certain leprous and tuberculous sera is to be expected; the author reports its occurrence with his antigen in tuberculosis, but offers no evidence of its occurrence in leprosy.

The method of preparation is described in detail. G. L. Robinson

RITTERSON, A. L. **Studies on Leishmaniasis in the Golden Hamster.** *J. Parasitology.* 1955, Dec., v. 41, No. 6, 603-12, 1 text fig. & 5 figs. on 2 pls. [15 refs.]

This study concerns the host-parasite relations in hamsters experimentally infected by the intraperitoneal route with teased-up spleen

tissues of a donor-hamster parasitized by *Leishmania donovani*. The effect of the parasite upon the hosts was assessed mainly on the basis of the weight of their organs, liver nitrogen content, and histopathological changes. It was found that in infected animals the weights of liver, spleen, kidneys and adrenals increased, but the nitrogen content of the liver showed no appreciable rise. The infection produced oedema, which was associated with liver damage and kidney failure, and there was progressive degeneration of the adrenal cortex. The pathological changes are illustrated in two plates.

C. A. Hoare

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

GIROUD, P. & ROGER, F. Constatations sérologiques concernant les rickettsies vraies ou les néorickettsies, faites en pays divers, au cours de lésions oculaires aiguës, a type de chorioretinite, s'accompagnant ou non de réactions méningées. [**Serological Findings in Connexion with the True Rickettsiae and the Neo-Rickettsiae in Different Countries, in association with Acute Ocular Lesions of the Chorioretinitis Type; either with or without Meningeal Reactions**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 582–7.

The authors describe the results of a series of tests of the sera of patients suffering from chorioretinitis. The micro-agglutination reaction of Giroud and Jadin was employed in testing for antibodies of epidemic typhus, murine typhus, boutonneuse fever and Q fever. The same reaction or a complement-fixation test was employed for detecting the antibodies of diseases caused by the neo-rickettsiae which are regarded as pathogenic organisms related to those of the psittacosis group and as forming a link between the rickettsiae and the viruses. The Weil-Felix test was not considered satisfactory because of its lack of specificity and reliability.

Among the sera of 38 patients from various places in France, Africa and the Far East the positive results were: 8 for boutonneuse fever, 2 for epidemic typhus, 1 for Q fever, none for murine typhus, and 15 for neo-rickettsial diseases. Most of the positive findings in the last group were obtained with antigens of 3 strains of neo-rickettsiae, all of the pulmonary type, and named X14, V14 and T13.

The results of the tests were confirmed by the good results following treatment with the broad-spectrum antibiotics, especially with aureomycin [chlortetracycline] in the cases of neo-rickettsial diseases.

John W. D. Megaw

COBURN, C. **Typhus Fever in South Africa. A Study of some of the Epidemiological Aspects.** *South African J. Med. Sci.* 1955, Sept., v. 20, No. 2, 79-89, 5 figs. [12 refs.]

"It was not possible to assess the exact importance of DDT in the gradual reduction of the incidence of Typhus within the Union, owing to the lack of records and suitable data.

"The latitude-longitude grid system for mapping the distribution of typhus by loci was used to provide a numerical basis for the computations that had to be made, and proved satisfactory.

"An assessment of the importance of districts in the Union, involved in Typhus outbreaks between 1934-1954 was made, with the establishment of definite endemic foci.

"The radiating pattern produced by arranging the number of outbreaks on a frequency basis, and mapping them was shown not to be associated with climatic factors. Equally, the seasonal importance of climatic factors was minimized by the data produced and examined.

"The rhythm of typhus outbreaks appeared to be an irregular one within periods of two years, while the period of time under consideration was not long enough to more than suggest a periodicity of 4-5 years over longer periods."

REISS-GUTFREUND, Ruth J. Isolement de souches de *Rickettsia prowazeki* à partir du sang des animaux domestiques d'Éthiopie et de leurs tiques. [**The Isolation of *Rickettsia prowazeki* from the Blood of Domestic Animals and their Ticks in Ethiopia**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 602-6.

The author has made the remarkable discovery in Addis Ababa that *Rickettsia prowazeki* can be isolated from naturally-infected animals and their ticks, which therefore may prove to be reservoirs of infection of louse-borne typhus.

In the course of 19 attempts to isolate *R. prowazeki* from goats, sheep and cattle, by inoculating their blood intraperitoneally into guineapigs, 3 strains were recovered, one from a goat and 2 from sheep. In 92 attempts to isolate the rickettsiae in the same way from suspensions of 2-10 ticks of 7 different species, collected from domestic animals, fowls and camels, 6 strains were recovered: 2 of these were from *Amblyomma variegatum* from cattle and 4 were from *Hyalomma rufipes* found feeding on 3 cattle and one camel.

All the strains were found to have the same pathogenic and antigenic properties as the classical strains of the organism. Inoculated guineapigs developed short febrile attacks on the 8th to the 10th day, without scrotal reaction: there was no invasion of cell nuclei: smears from the peritoneum showed scanty rickettsiae and absence of Mooser cells. Transfers through guineapigs by the cerebral-intraperitoneal method were readily effected. Mice inoculated by the intranasal route developed the

usual type of rickettsial pneumonia, and lice could be infected by the intrarectal route. Yolk-sac inoculation was also successful. The isolated rickettsiae behaved in the usual manner when used as antigens in the micro-agglutination slide test for the presence of antibodies in the sera of animals inoculated with classical strains of *R. prowazeki*. Cross-immunity tests were also carried out; they confirmed the other findings.

Young lambs 5-6 days old were inoculated intraperitoneally with strains of animal and tick origin; they caused febrile reactions lasting about 6-7 days and the animals developed rickettsia-agglutination reactions; both of these responses were exactly similar to those caused by classical strains. Ticks were infected by feeding on heavily infected rabbits.

In the discussion of this paper GIROUD mentioned that he and JADIN in 1949-50 had found serological evidence of epidemic typhus infection among cattle, goats, pigs and dogs in Ruanda-Urundi [this *Bulletin*, 1954, v. 51, 902], but had failed to isolate the rickettsiae from the blood or brain suspensions of the animals.

John W. D. Megaw

SUREAU, P., ROUSILHON, J. P. & CAPPONI, M. Le typhus murin à Dalat : état actuel de la question. Isolement d'une souche. [**Murine Typhus at Dalat, South Vietnam; the Present Situation. Isolation of a Strain**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 599-602.

During the years 1939-1942 strains of *Rickettsia mooseri* were frequently isolated from patients in Dalat and the mountainous plateaux in South Vietnam, but since that time the diagnosis of the numerous cases which occurred was made solely by the Weil-Felix test. In 1954 as many as 99 cases were diagnosed at the civil hospital of Rabat. Since October 1954 the authors have employed the slide rickettsia-agglutination test and have obtained positive reactions in 14 patients during the first 3 months of 1955, at titres ranging from 1 in 320 to 1 in 1,280. One strain has been isolated from a patient and identified. It appears, therefore, that the disease persists in endemic form in the high plateaux of Central Annam.

John W. D. Megaw

DEPOUX, R. & MERVEILLE, P., with the technical collaboration of BLANCHOT. Sur une petite épidémie de fièvre exanthématique observée à Brazzaville. [**A Small Epidemic of an Exanthematic Fever in Brazzaville (French Equatorial Africa)**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 610-15. [19 refs.]

This is a description of a study by the complement-fixation test of the sera of 26 patients convalescing from an exanthematic fever in which the clinical features had been exactly similar to those described by PELLISSIER and TRINQUIER, in 1949, among patients in French Equatorial Africa who were suffering from a disease which they called *fièvre rouge Congolaise*, and which they regarded as differing from fevers of the boutonneuse

group because the rickettsiae which were isolated showed no cross immunity with the rickettsiae of the tick typhus of Tunis [see this *Bulletin*, 1950, v. 47, 459].

The present authors found completely negative responses with complement-fixation tests for Q fever (2 strains), epidemic typhus, murine typhus and lymphogranulomatosis; for rickettsialpox there were 5 feebly positive reactions and 21 were completely negative. For boutonneuse fever there were 25 positive, and only 1 negative, reactions.

These findings are regarded as providing clear evidence that the disease belongs to the boutonneuse fever group.

[The authors seem to be justified in their conclusion, which for practical purposes conforms with the suggestion of the abstracter in his comment on the paper by Pellissier and Trinquier. This was that the fever described by them as "red fever of the Congo", which was admittedly a tick-borne typhus-like fever, could more suitably be classified provisionally as a form of tick typhus rather than to give it a name which had been applied to several diseases including epidemic and murine typhus and even dengue.]

John W. D. Megaw

MIMOUNE, G., PIERROU, M., VASTEL, G. & MARC, P. Enquête sur une épidémie massive de Q fever survenue à Batna (Algérie) chez de jeunes militaires de la métropole. [**A Large Explosive Outbreak of Q Fever among Young French Soldiers in Batna (Algeria)**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 590-98, 5 figs. [26 refs.]

In this outbreak of Q fever 175 young French soldiers were attacked between March 24 and early June in Batna, Algeria. All the patients belonged to the same battalion, which had arrived from France a few months previously. Most of the attacks occurred in the form of an explosive outbreak in the month of April. Ten days before the onset of the first case the troops had made a journey of 24 hours in railway wagons which had been used recently for the transport of sheep and had not been properly cleaned so that they still contained straw and rubbish contaminated by the excreta of the animals. The most probable source of infection was the inhalation of infected dust formed by the drying of these contaminated materials.

On arriving at Batna the battalion occupied stables in which a few horses and some sheep had been kept.

John W. D. Megaw

BETTINOTTI, C. M. Fiebre Q.—Anticuerpos fijadores de complemento en la población de Córdoba (R.A.). [**Complement-Fixation Tests for Q Fever in Córdoba, Argentina**] *Semana Méd.* 1956, Jan. 26, v. 108, No. 4, 123-7. [21 refs.]

The English summary appended to the paper is as follows:—

"Results are presented of complement fixation tests with Coxiella burnetii antigen (Q fever, Lederle) in Córdoba, R.A.

"In 150 samples of human serum taken at random of the general population, 21 resulted positive in dilution 1/8 or higher (14%), and 9 were positive in dilution 1/16 or higher (6%).

"This finding may be considered a comprobation of the presence of infection of *Coxiella burnetii* in the human population of Argentina."

BADIALI, C. & VENTURI, R. Sulla presunta esistenza di frazioni antigeni comuni alla *Rickettsia burneti* e alle brucelle. [**The Supposed Existence of a Common Antigen between *Rickettsia burneti* and *Brucella***] *Riv. Italiana d'Igiene*. 1955, Nov.-Dec., v. 15, Nos. 11/12, 460-66.

The English summary appended to the paper is as follows:—

"From examination of 544 sera, 508 human and 36 animal, and on the basis of experimental research with laboratory animals, the Authors conclude that antigenic relationships between *Rickettsia burneti* and *Brucellae* do not exist."

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

LEVI-CASTILLO, R. La dispersión de los mosquitos del género *Haemagogus* en la República del Ecuador (nota previa). [**Distribution of *Haemagogus* Mosquitoes in Ecuador**] *Rev. Ecuatoriana de Entom. y Parasit.* Guayaquil. 1954-1955, v. 2, Nos. 3/4, 410-16, 3 figs. & 1 map. [10 refs.]

The English summary appended to the paper is as follows:—

"The author describes the ecological conditions that govern the dispersion of *Haemagogus* mosquitoes in the coastal and amazonic plains of Ecuador. The rain forest in the Amazon region is different in structure to the jungles of the coastal plain that are determined in their structure by the Humboldt and El Niño sea-currents, the first cold and the second warm. Dispersion of *H. spegazzinii* falco is recent due to the optimum conditions presented by the destruction of bamboo forests and the planting of banana trees, leaving the bamboo stumps where larvae readily thrive during the rainy season, adults migrate into the subtropical jungles located in the sribes [mountain ridges] of the Andean orographic system. *Haemagogus panarchys* is only found in the sribes [ridges] of the orographic system of Chongón and Colonche in Guayas province.

Recently was captured in Esmeraldas province a new species of *Haemagogus*: *H. garciai* that was found in the islands of the Bay of Ancon de Sardinas."

RABIES

CAPPONI, M. & SUREAU, P. Une épidémie de rage canine à Dalat (Centre-Vietnam). [**An Epizootic of Canine Rabies at Dalat (Central Viet-Nam)**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 616-19, 1 fig.

In the town of Dalat, where since 1936 rabies had been diagnosed only once (in a dog which, coming from Cochin-China, had developed the disease but failed to transmit the virus), an epizootic of canine rabies began in October 1954, when 2 dogs, placed under observation after having bitten a number of the town's inhabitants, died of that disease. From then until the time when, as a result of the strict application of specific control measures, including mass vaccination of dogs and elimination of stray animals, the epizootic was brought to an end in April 1955, the brains of 38 more dogs sent by the veterinary authorities to the Pasteur Institute, Dalat, were shown by histological examination and animal inoculation to be positive for rabies. During the period of epizootic animals concerned in the biting of human beings numbered 178, namely 177 dogs and one horse, and of these animals the brains of 42 were subjected to laboratory investigation; 35, including that of the horse, gave positive results, mice, guineapigs and rabbits dying of paralytic rabies in an average time of 10, 17 and 13 days, respectively, after intracerebral inoculation with brain suspensions and showing in almost every instance the presence of Negri bodies in impressions made from their Ammon's horns and stained by Sellers's method. Because of their having been bitten, 205 persons were treated with phenolized anti-rabies vaccine, and of that number 75 had been bitten by animals in which the diagnosis of rabies was later confirmed. No failures or accidents of treatment occurred.

During the same 7-month period the early diagnosis of rabies in animals dying under observation or killed by their owners was attempted by means of complement-fixation tests, in which the antigen used was emulsions of brain removed from the animals suspected of rabies and the immune serum one prepared from rabbits hyperimmunized with phenolized rabies virus vaccine. Fixation was found to occur in a majority of cases in which the brain material on later intracerebral inoculation produced paralytic rabies in experimental animals. Doubtful or negative results in complement-fixation tests cannot, however, justify

the non-treatment of persons bitten by animals suspected of being rabid. Finally, some indication as to whether vaccine treatment should be reinstituted in the case of a person previously treated and re-exposed to infection may be given by the evidence provided by the complement-fixation test of the presence of complement-binding antibody in that person's serum.

G. Stuart

CONSTANTINESCU, N., DRAGOMIR, C., DUCA, E., DUCA, M. & TEODOROVICI, G. Tulpini de virus rabic izolate în Moldova. Activitate patogenă, capacitate de fixare și calități antigenice. [**Strains of Rabies Virus Isolated in Moldavia. Pathogenicity, Adaptation and Antigenicity**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1954, July-Dec., v. 5, Nos. 3/4, 291-347, 9 figs. [23 refs.] French summary.

The authors have studied 43 strains of rabies virus isolated in Moldavia; 17 were isolated from animals and 26 from human cases. White rats were found to be superior to rabbits and dogs for experimental studies on rabies, as they were fully susceptible to street virus, and Negri bodies could be found without difficulty. Of the strains isolated from animals 2 from dogs and 1 from a wolf showed reduced pathogenicity for rats and did not exceed a titre of 10^2 , 5 strains were of moderate virulence (titre 10^3) and 2 were fully virulent (titre 10^4). The incubation period in the human cases ranged from 18 to 737 days; 14 patients died during or after treatment with phenolized vaccine. Of 12 strains isolated from untreated patients 8 were of moderate and 4 of high virulence; 14 strains from persons who died in spite of treatment were mostly of low virulence, and the failure must therefore be ascribed to inadequacy of the vaccine.

D. J. Bauer

VIEUCHANGE, J., BÉQUIGNON, R., GRUEST, Jacqueline & VIALAT, C. Affinité du virus rabique fixe pour les cellules d'origine rénale cultivées *in vitro*. [**Affinity of Fixed Rabies Virus for Renal Cells cultivated in vitro**] *Bull. Acad. Nat. Méd.* 1956, v. 140, Nos. 5/6, 77-9.

The following is a translation of the authors' summary:—

When fixed rabies virus was inoculated into tissue cultures either from the nervous system or from the kidney, no difference in the behaviour of the virus was noticed whichever type of tissue cell was used. With roller tube cultures it was possible, after inoculation with fixed virus, to observe virus multiplication in tissue culture explants from mammalian kidney: virus was liberated in the medium to a degree equal to that obtained in cultures from nervous tissue carried out under comparable conditions.

H. J. O'D. Burke-Gaffney

MÎRZA, L., NASTAC, E. & IACOB, C. Influența virusului rabic de stradă asupra activității nervoase superioare la șobolanii albi. [**The Influence of Street Rabies Virus on Higher Nervous Activity in White Rats**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1954, July-Dec., v. 5, Nos. 3/4, 359-82. [14 refs.] French summary.

A conditioned reflex was established in 11 rats; 9 were then inoculated with rabies virus intramuscularly and 2 were given uninfected material as a control. In 4 rats which died after 16 and 37 days changes in the conditioned reflex consisting of prolongation of the latent period and the appearance of inhibition were observed as early as 3 days after infection. Similar changes occurred in 5 rats which showed no symptoms over a period of 3½ months, but the conditioned reflex was unaffected by the control inoculation.

D. J. Bauer

STROESCU, P., PORTOCALA, R., SCHWARTZ, J., ADERCA, I., MOSCOVICI, O., HAAS, H. & DANIELESCU, G. Cercetări asupra septinevritei în "turbarea închisă". [**Investigations on Infection of the Central Nervous System in "Closed Rabies"**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1954, July-Dec., v. 5, Nos. 3/4, 409-18, 17 figs. on 6 pls. [14 refs.] French summary.

Twenty-five rabbits received a single dose of rabies vaccine by intramuscular injection and were inoculated with street virus by the same route 3 weeks later; 20 died of rabies, and the 5 survivors succumbed to subsequent intracerebral challenge. The presence of virus in the brain, parotid gland, sciatic, brachial, vagus and sympathetic nerves was determined by the subinoculation of mice, and pieces of the same tissues were examined histologically. In 14 animals no virus was present in the parotid gland ("closed rabies"); in 13 virus was present in the brain. Marked inflammatory changes with Negri bodies were observed in the sympathetic and parasympathetic ganglia, and the authors consider that rabies virus has a predilection for the autonomic system [it is not clearly stated if virus could be detected in the autonomic ganglia].

D. J. Bauer

CONSTANTINESCU, N., TOMA, A. & DINU, R. Cercetări experimentale asupra imunității numită "naturală" a ciinelui în infecția rabică. [**Investigation of Natural Immunity to Rabies in Dogs**] *Studii și Cercetări Inframicrobiol., Microbiol. și Parazitol.* 1954, July-Dec., v. 5, Nos. 3/4, 269-89. [16 refs.] French summary.

Eight of 160 dogs examined by the authors in Iași, Rumania, were naturally immune to rabies, and survived 2-4 challenge inoculations with street virus by the intracerebral and intraocular routes. Small amounts of antibody were detected in the sera of the immune dogs by means of

neutralization tests with fixed virus, but no neutralization occurred when extracts of the brain and peripheral nerves of one immune dog were incubated with fixed virus for 1 hour at 37°C. Of 10 dogs inoculated with street virus intradermally 2 developed rabies and 8 became immune, and immunity was similarly produced in 8 of 12 guineapigs. The authors suggest that dogs may develop immunity to rabies as a result of repeated infection with sublethal doses of virus.

D. J. Bauer

SAWAI, Y. & MAKINO, M. **Studies on the Purification of Rabies Virus by the Methanol Precipitation.** *Japanese J. Exper. Med.* 1954, Aug., v. 24, No. 4, 229-33.

A technique for the concentration and purification of rabies virus by precipitation with methanol is given in detail. The technique differs in no significant respect from that described by Cox *et al.* [*Bull. Hyg.*, 1948, v. 23, 640]. Application of this technique to the rabies virus in infected brains of guineapigs and goats showed the concentration of methanol required for maximum precipitation (after 3 hours at -5° to -10°C.) to be 30 per cent. and the optimal pH for elution of the virus to be about 7.

In purified virus preparations resulting from this treatment of crude suspensions of brain material the virus was found to have retained much of its original activity, while the reduction of nitrogen content proved to be from 41 to 47 per cent.

The purified preparations were then inactivated by ultra-violet irradiation and injected into mice, in order to assess their prophylactic potency as anti-rabies vaccines. Mice so injected showed a very high degree of protection when later challenged with virus of an LD₅₀ value of 10⁻⁶ dilution.

G. Stuart

GALLO, P. & VALERI, H. Estudios sobre el poder inmunológico de una vacuna antirrábica. (Rabia pasesiante) al CaCl₂. [**Studies on the Immunological Potency of Rabies Vaccine with CaCl₂**] *Rev. Med. Vet. y Parasit.* Caracas. 1954, Jan.-Dec., v. 13, Nos. 1/4, 27-30.

The English summary appended to the paper is as follows:—

“The immunology power of Rabies paralytic vaccine (‘Bolivar’ strain) with CaCl₂, was investigated, finding the protection index somewhat superior as that of the current phenolized vaccine.”

DEVI, P., D'SILVA, C. B. & AHUJA, M. L. **Studies on the Concentration and Purification of Antirabic Serum.** *Indian J. Med. Res.* 1956, Jan., v. 44, No. 1, 157-61.

The anti-rabies serum of the Central Research Institute, Kasauli, is prepared from horses hyperimmunized with fixed rabies virus which is

administered subcutaneously. The horses are first given a series of injections of 20 per cent. phenolized inactivated virus in a daily dosage of 5 cc. on 14 consecutive days. Following this initial immunization they next receive, once monthly for 8 months, non-attenuated fixed virus combined with adjuvants (Falba, Bayol F), the dosage increasing from 1 cc. of 10 per cent. to 10 cc. of 20 per cent. live virus with adjuvants. After an interval of 3 months the animals are then given, once monthly for 3 months, 10 cc. of 20 per cent. live virus with adjuvants. When the viricidal antibodies in the animals' sera have reached the desired level, *i.e.* when a 1 cc. dose of serum proves, on test, to be capable of neutralizing up to one million or more doses of standard challenge virus (CVS) lethal for the guineapig, the horses are bled and the plasma or serum is used for concentration and purification.

Of the various methods of concentration and purification used at the Institute since 1950 that of precipitation of the water-insoluble globulins by iso-electric precipitation, followed by precipitation of the remaining globulins by 50 per cent. saturation with ammonium sulphate, has provided the most consistent results and, in consequence, has been since 1953, the method adopted there. Following application of this method the antiviral activity of the concentrates is assessed by determination of their ED₅₀ and the recovery of antibody calculated; the total solids and the total proteins in each concentration are also determined.

When compared with an original serum, which had an antiviral activity of one million guineapig LD₅₀ and a protein content of 7.16 per cent., the concentrates obtained by this method in 3 experiments cited had a volume of one-sixth of that of the original and showed the antibody recovery to be from 90 to 95 per cent., while the purity, as evidenced by total solids and protein nitrogen, varied from 14.10 to 18.46 per cent. and from 9.06 to 13.90 per cent., respectively.

G. Stuart

BERKE, Z. & TÜRKAY, N. [**Experimental Studies on the Effect of Hyperimmune Antirabies Serum**] *Türk İhyen ve Tecrübi Biyoloji Dergisi*. Ankara. 1955, v. 15, No. 3, 317-21. [Fuller version in Turkish 307-17. (27 refs.)]

The object of these studies was to determine experimentally the comparative values of hyperimmune serum, of living and inactivated virus vaccines, and of serum combined with vaccine in the post-exposure prophylaxis of rabies.

To this end guineapigs of 250-300 gm. weight were infected subcutaneously with 10 LD₅₀ of Lépine's mouse-adapted strain of rabies virus and thereafter treated in groups with one or other of the following: hyperimmune serum alone in a daily dosage, begun 18 hours after infection, of 2 ml. for 5, 10 or 15 days (Series A); Högyes vaccine (1 per cent.

suspension of infected rabbit brain) or Semple vaccine (5 per cent. suspension of infected sheep brain inactivated with phenol) in a daily dosage, begun 24 hours after infection, of 0.5 ml. for 10, 15 or 20 days (Series B); hyperimmune serum, begun 24 hours after infection, in a daily dosage of 2 ml. for 2, 3, 4 or 5 days, and followed 24 hours later by a daily dose of 0.5 ml. Högyes or Semple vaccine for 20, 19, 18 and 17 days, respectively (Series C); hyperimmune serum 2 ml. mixed with Högyes vaccine 0.5 ml. administered 24 hours after infection and continued for 8 days, followed 24 hours later by a daily dose of 0.5 ml. Högyes vaccine for 14 days (Series D); hyperimmune serum 2 ml. given simultaneously with Högyes vaccine 0.5 ml. in different regions of the animals subcutaneously: this treatment, begun 24 hours after infection and continued for 8 days, was followed by 0.5 ml. Högyes vaccine daily for 14 days.

Results showed that only in Series C, in the groups receiving hyperimmune serum, followed 24 hours later by a course of antirabies vaccine, whether that of Högyes or of Semple, was 100 per cent. survival among the experimental animals achieved. These results correspond with those following present-day treatment of bitten persons in Turkey. Since early 1955 persons who have been severely wounded by rabid or suspectedly rabid animals and have reported for treatment within 72 hours of the time of wounding, have received hyperimmune serum in a total dosage of 0.5 ml. per kgm. of body weight twice daily on two successive days and thereafter a course of Semple vaccine, begun 24 hours after the last serum injection and administered over 20 consecutive days in a daily dosage of 4 ml. (2 ml. for children under 5 years of age). There have been no failures with this method of treatment.

[In the treatment of persons severely bitten by rabid wolves in Iran, similar success with hyperimmune serum, followed by a 21-day course of 5 per cent. Semple vaccine, has been reported by BALTAZARD *et al.* (this *Bulletin*, 1956, v. 53, 434).]

G. Stuart

AGARWAL, S. C. **Biochemical Patterns in Blood in Experimental Rabies.**
Indian J. Med. Res. 1956, Jan., v. 44, No. 1, 37-41.

“Biochemical changes in experimentally-induced rabies infection in sheep have been studied. It has been observed that generally there is a notable rise in plasma iron, a marked fall in blood cholesterol and a lowering of the inorganic phosphates. The end products of protein metabolism are not much affected. There is a slight rise in the fasting blood sugar when the animal is in a moribund stage.”

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

GIRARD, G., with the technical collaboration of A. CHEVALIER. Action partiellement inhibitrice du bouillon nutritif sur la croissance de *Pasteurella pestis*. [**The Partial Inhibitory Effect of Nutritive Broth on the Growth of *Pasteurella pestis***] *Ann. Inst. Pasteur*. 1956, Jan., v. 90, No. 1, 8–12, 3 figs. on pl.

The author has found that the peptone broth used in the preparation of nutritive agar contains substances which inhibit the growth of *Pasteurella pestis* unless large doses of the inoculum are employed. This inhibition can be prevented by adding blood or serum to the medium, but more simply and more cheaply by eliminating the beef broth from the preparation and using a plain water solution of certain brands of peptone such as Uclaf [this *Bulletin*, 1949, v. 46, 736], PTV or Difco in the preparation of the agar medium.

With the simple peptone-agar medium growth can be obtained from a single cell, whereas with peptone-broth agar at least 1,000 cells are needed. Photographs of cultures show that with a given dose of inoculum the growth on blood agar with nutrient broth and the growth on plain peptone agar were equally rich on slope cultures, in striking contrast to scanty or no growth on the peptone-nutrient-broth-agar media. It had formerly been supposed that the beef broth contained in nutrient-peptone-agar media was deficient in some food factor which was supplied by the addition of blood or serum.

Incidentally it was found that the broth in the ordinary peptone-nutrient-broth-agar medium had no inhibiting effect on the growth of *Pasteurella pseudotuberculosis*.
John W. D. Megaw

QUAN, S. F. & KARTMAN, L. **The Resistance of *Microtus* and *Peromyscus* to Infection by *Pasteurella pestis***. [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 104–5.

This letter contains some pertinent comments on a letter from OLITZKI in the *Trans. Roy. Soc. Trop. Med. and Hyg.* [see this *Bulletin*, 1955, v. 52, 768]. The authors agree with Olitzki in rejecting the theory that the field mouse *Microtus guentheri* could have been the immediate vector in the epidemic of plague among the Philistines which is referred to in the Bible, for the reason already stated by Sir William MACARTHUR in the same journal [*ibid.*, 1952, v. 49, 1111], which was that the epidemic was primarily urban so that rats, probably *Rattus rattus alexandrinus*, must have played a predominant part in transmission of infection.

They differ from Olitzki when he implies that *M. guentheri* from the coastal plain of Israel could not have been concerned in the epidemiology of the epidemic of plague among the Philistines because he found that laboratory-bred mice of this species were relatively resistant to infection with *P. pestis*. They describe experiments with field mice of two species, the Californian vole, *Microtus californicus* and the deer mouse, *Peromyscus maniculatus*; both of these show pronounced differences in susceptibility between laboratory-bred and field-caught mice of the same species; so also batches of mice of each species captured in different localities varied greatly in resistance to infection; in one case these localities were situated at a distance of only 3 miles from each other.

The authors also point out that several investigators regard plague-resistant rodents as being of paramount importance in the maintenance of permanent foci of enzootic plague. This view is supported by their own belief that the relatively resistant *M. californicus* is important as a permanent reservoir of infection in the plague foci of San Francisco Bay area.

They conclude by stating that "The possible hazard of an outbreak of human plague, ultimately originating in this type of arthropozoonosis [*sic*] depends upon a host of complicating ecological factors and is difficult to evaluate at this time."

[The above long word is obviously a printer's error for "anthropozoonosis," meaning a disease common to man and lower animals.]

John W. D. Megaw

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

FRETER, R. **The Serologic Character of Cholera *Vibrio Mucinae*.** *J. Infect. Dis.* 1955, Nov.-Dec., v. 97, No. 3, 238-45. [14 refs.]

The author investigated the serological characteristics of the mucinase prepared from 17 strains of *Vibrio cholerae* (10 Ogawa and 3 Inaba, the remainder being of undetermined type) and 3 water vibrios isolated near Chicago. These water vibrios did not agglutinate with O anti-cholera serum. The antimucinase sera were prepared by injecting rabbits with increasing quantities of 0.5 to 2 ml. of mucinase at 5-day intervals, the animals being bled 8 days after the last injection. Standard ovomucin was prepared by a simplification of the method of Young (*J. Biol. Chem.*, 1937, v. 120, 1) and diluted with 0.85 per cent. saline until a further dilution of 1 in 2 gave a precipitate with 1 drop of 0.1 per cent. protamine sulphate but a dilution of 1 in 4 did not. Doubling dilutions

of mucinase in 0.25 ml. amounts were made in 5 per cent. normal serum, and in 5 per cent. antimucinase serum, and an equal amount of standard ovomucin added. After 1 hour at 37°C. the highest dilution of antimucinase serum giving no precipitate with protamine sulphate was taken as the mucinase titre. The ratio of the mucinase titre in 5 per cent. normal serum to that in 5 per cent. antiserum is the "fractional inhibition" and its reciprocal is the number of antimucinase units of the given serum.

Not all antisera inhibited enzymes from the heterologous strains to the same extent as the homologous mucinases, suggesting that more than one type of mucinase was present. Cross-neutralization tests with the 20 strains and antisera appeared to show that there were many serological types, but the author demonstrates that the results can be explained by assuming only 2 types, A and B, present in the different preparations in varying proportions, and describes how the distribution and proportion of these two types can be ascertained. Neither of the 2 types can be identical with the receptor-destroying enzyme (RDE) for that enzyme is not antigenic in rabbits, acts only slowly on ovomucin, and renders it non-precipitable with protamine sulphate. Moreover, it is inactivated at high pH and the mucinases considered were prepared at pH 8.2 to 8.5. In addition one of them, containing both types A and B, did not cause any T agglutination of chicken cells, a test used by BURNET and STONE for the titration of RDE [*Bull. Hyg.*, 1948, v. 23, 290]. No conclusions can be drawn as to the virulence of a given strain of *V. cholerae* from the activity or serological types of mucinase produced, since the water vibrios produced high titre mucinases serologically related to those from the cholera vibrios. There was no consistent difference in titre or serological composition in mucinases from strains recently isolated from fatal cases or those isolated from patients who recovered. Mucinase titres differed considerably in different batches produced by the same strain and the same strain might produce mucinases of different titre in different media. Successive isolations from the same patient gave markedly different titres though here there might have been a selection of mutants in the patient.

The titre and serological type of mucinase produced have no relation to the virulence, colonial morphology, or O antigenic structure of the vibrio tested though the experiments give no information as to the part played by mucinase in the pathogenicity of cholera vibrios. C. C. B. Gilmour

LAM, G. T., MANDLE, R. J. & GOODNER, K. **The Effect of *Vibrio comma* Mucinase upon the Permeability of Mouse Intestine.** *J. Infect. Dis.* 1955, Nov.-Dec., v. 97, No. 3, 268-73, 4 figs.

This paper deals with the effect of immunization with cholera mucinase and vaccine on the permeability of mouse intestine produced by cholerae

mucinase, and gives a detailed description of the methods employed. The mice were immunized by 3 intraperitoneal injections of 0.2 ml. of mucinase at 3-day intervals either alone or in combination with an equal amount of a suspension containing 900,000 vibrios per ml. They were tested 7 to 15 days after the last injection. The small intestine was removed and, after the injection of 0.6 ml. of the material to be tested into the lumen, was immersed in Tyrode solution and a manometer was attached to a cannula in the free end, the other end being closed. After equilibration the changes in the height of the manometer fluid were observed. In a second series of experiments the intestines were observed *in situ*. A cannula was inserted into the duodenum and connected to a manometer, and after ligation of the intestine at the caecal junction the test material was introduced and manometric observations made. The results are shown in figures.

The introduction of mucinase caused a marked pressure change interpreted as being due to fluid intake, occurring within 15 minutes and almost linear up to 30 minutes. Heat-inactivated mucinase caused no change in most cases but the increase was seldom above 5 mm. compared with 30 mm. with the unheated material. When there was increase of pressure it was found that there was a rise in weight of 0.2 to 0.4 gm. The intestines of mice passively immunized by 0.5 ml. of rabbit anti-mucinase serum showed no significant increase in permeability and when tested with heat-inactivated mucinase gave no significant pressure change. The intestines of mice actively immunized with cholera mucinase gave results similar to those obtained with passive immunization, and when mucinase and vaccine were combined similar results were obtained. Mice immunized with bacterial cells alone showed a higher sensitivity to mucinase far above that of non-immunized animals. In the experiments done *in vivo* non-immunized animals gave a rapid increase in manometric height and in these experiments the fluid came from the animals themselves. The immunized animals showed negative readings indicating that there was no change in permeability and that fluid had probably been absorbed from the lumen.

The experiments show that *V. comma* [*V. cholerae*] mucinase alters the impermeability of the mouse intestine and that this can be blocked by active or passive immunization against the mucinase.

The results support JENSEN's suggestion [this *Bulletin*, 1954, v. 51, 176] that mucinase should be added to cholera vaccine.

C. C. B. Gilmour

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

MACKIE, T. T., MACKIE, J. W., VAUGHN, C. M., GLEASON, N. N., GREENBERG, B. G., NENNINGER, E. S., LUNDE, M. N., MOORE, L. L. A., KLUTTZ, J. A. & TALIAFERO, M. O. **Intestinal Parasitic Infections in Forsyth County, North Carolina. III. Amebiasis in School Children, an Index of Prevalence.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 980-88. [25 refs.]

"1. The observed prevalence of *Entamoeba histolytica* in a statistically valid sample of the school child population of Forsyth County, North Carolina was 6.1 per cent.

"2. No significant differences in prevalence were observed with respect to race, sex or residence, whether urban or rural.

"3. The observed prevalence of *E. histolytica* among the family members of urban children who were found to be infected was more than three times that of the observed prevalence among the total sample of 1,934 school children examined.

"4. The observed prevalence of *E. histolytica* among the family members of infected urban children was more than 30 times greater than the observed prevalence in a statistically comparable group of family members of apparently uninfected urban school children.

"5. These findings support the hypothesis that the examination of school children in Grades II through V provides a simple, relatively inexpensive effective method of case-finding to determine the prevalence of amebiasis in a community."

SIMITCH, T., PETROVITCH, Z. & CHIBALITCH, D. Choix des milieux de culture pour l'isolement et l'entretien d'*Entamoeba dysenteriae* in vitro. [**Choice of Culture Media for the Isolation and Maintenance of *Entamoeba histolytica* in vitro**] *Arch. Inst. Pasteur d'Algérie.* 1955, Sept., v. 33, No. 3, 250-57.

In contrast to most workers, who rely upon stool examinations for the diagnosis of amoebic infection in view of the uncertainty of the results obtained from faecal cultures, the authors claim to be able to detect the infection in all the cases examined by them by the cultural method, including patients with chronic amoebiasis and symptomless carriers, and irrespective of the consistency of the stools. The success, according to them, depends on the choice of suitable media.

In the present paper an account is given of the results of a comparative study on the cultivation of *E. histolytica* from stools in various media.

The most satisfactory results were obtained with a modification of Löffler-serum medium, which is used by the authors for routine purposes [this *Bulletin*, 1955, v. 52, 365]. It consists of a slope of coagulated bovine serum (95 per cent.) with broth containing 2 per cent. glucose (5 per cent.), while the liquid phase is represented by saline, to which rice starch is added. The essential part of the method employed is the replacement of the old liquid phase by fresh saline at regular intervals, instead of the usual subinoculation into fresh tubes. This medium proved to be most satisfactory both for the isolation and maintenance of cultures of *E. histolytica*. Among the other media used, those of Dobell and Laidlaw and of Boeck and Drbohlav were found to be less suitable for the isolation and growth of the amoebae, while the least satisfactory results were obtained with Cleveland and Collier's medium. C. A. Hoare

CAPOCACCIA, L. Ricerche sulla coltivazione dell'*Entamoeba histolytica*. [Researches on the Cultivation of *Entamoeba histolytica*] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Dec., v. 36, No. 12, 662-4.

The author describes a new method for the cultivation of *Entamoeba histolytica*, which combines the properties of egg and liver media. Its preparation and composition are as follows: (a) 4 whole eggs and the yolk of a 5th are beaten up and 30 cc. of Locke's solution are added to it; (b) 300 cc. of a 3 per cent. solution of agar in infusion of heart and brain are sterilized, and—after cooling to 55-60°C.—(a) and (b) are mixed together; (c) the mixture is homogenized by shaking, then an extract of 4 gm. of liver is added to it, the whole is shaken, and distributed in test-tubes; (d) these are heated to 80°C. and allowed to cool, after which (e) 6:1 Ringer serum (representing the liquid phase) is added to them, and the medium is ready for use, after addition of rice powder.

C. A. Hoare

GREENBERG, J., TAYLOR, D. Jane & BOND, H. W. Glucosamine in the Culture of *Entamoeba histolytica* with a Mixed Bacterial Flora. *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 62-6.

The authors have already shown (*J. Parasit.*, 1954, v. 40, Sect. 2 (Suppl.), 22) that *E. histolytica* can grow in the presence of bacteria in a liquid medium containing salts, trace minerals, egg albumin and rice powder when an amine or amino alcohol is added. The need for the amine appears to be specific and this need has been further investigated as well as the effect of changing proteins and sources of non-protein nitrogen. In practice a medium was considered satisfactory if it supported 15 serial cultures made every second day. Gelatin, although deficient as a nutritional agent, was found to maintain growth of *E. histolytica* in presence of low concentrations of glucosamine, but not when one of 21 other nitrogen-containing substances was present. The

effect of this amine may be direct or indirect through its effect on bacteria which in turn affect growth of *E. histolytica*. In the mixture of inorganic salts, rice powder, glucosamine and gelatin in which *E. histolytica* could be grown, gelatin could be replaced by serum proteins and some protein digests but not by certain other proteins or amino-acid mixtures.

J. D. Fulton

MANSON-BAHR, P. **Facts and Fallacies in the Diagnosis of Amoebiasis.**

Central African J. of Med. 1955, Nov., v. 1, No. 6, 269-79, 39 figs. on 2 pls.

Sir Philip Manson-Bahr has drawn on his considerable experience to emphasize the necessity for a correct diagnosis before embarking on the treatment of amoebiasis. He gives an account of amoebiasis, amoebic dysentery, and its complications. He details the methods of diagnosis under the headings microscopic, clinical, sigmoidoscopic and proctoscopic. Though there is nothing original in his observations, this article merits very earnest consideration by those now practising medicine in the tropics where, as the author very rightly points out, "there is still a great deal of vagueness and hesitancy in arriving at the correct diagnosis of amoebic dysentery. . . ." In many parts of the world there is a regrettable tendency to disregard some of the teachings of scientific protozoology and, quite unjustifiably, to dub as amoebiasis a variety of conditions; this causes needless psychological repercussions on the patient. Competence, the result of knowledge and of continuous and prolonged practice, is essential in the examination of stools and other material for the parasitic protozoa; the absence of this competence is a major factor in the misdiagnosis of amoebiasis. In so far as the written word can impart the knowledge, this paper admirably serves its purpose; it is up to the practitioner and his associates to gain the skill and experience in the light of the knowledge it imparts.

A. R. D. Adams

DIAMOND, J. J. & SCRIBNER, R. A. **Amoebic Abscess of the Liver presenting in the Subscapular Area.** *Arch. Intern. Med.* 1956, Jan., v. 97, No. 1, 105-8, 4 figs.

A 24-year-old white American appeared at hospital with a soft localized swelling of 3 weeks' duration in the right sub-scapular area. He gave no history of gastro-intestinal troubles. Investigation revealed an enlarged liver, with raising of the right diaphragm. Some time after incision of the swelling amoebae were recognized in copious "anchovy sauce" material aspirated through a catheter passed into the chest. Chloroquine, carbarsone, and oxytetracycline treatment by mouth was ineffective; but continuous irrigation with a solution of oxytetracycline eventually produced marked clinical improvement and eventual healing. The patient was then discharged fully convalescent.

The patient said he had had a blow over the right lower ribs 3 months before he came for examination; the authors suggest that this injury may have precipitated the development of the amoebic liver abscess.

[There is no reference to any examination of the stools, and none to any treatment directed to ensuring the eradication of the presumable primary intestinal infection.]

A. R. D. Adams

DUFOUR, R., MORETTI, G., TASQUE, P. & MALEVILLE, J. Lymphosarcome du coecum chez un amibien. [**Lymphosarcoma of the Caecum in a Patient with Amoebiasis**] *J. Méd. de Bordeaux*. 1956, Feb., v. 133, No. 2, 147-9.

The differential diagnosis is discussed.

McHARDY, G., BROWNE, D. C., McHARDY, R. J. & WARD, S. S. **Erythromycin in Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 998-1001.

Seven patients with clinically quiescent amoebiasis were treated with 100 mgm. of erythromycin base every 6 hours for 10 days; none were freed of their infections. Eight more were given 200 mgm. of erythromycin stearate ("pediatric suspension") similarly; 5 were subsequently free from parasites over 6 months' observation. Forty-two were given 800 mgm. of the stearate as "film sealed" tablets daily for 10 days; of these [as far as can be determined from the text] 6 yielded parasites during the subsequent 6 months' observation [details of the examinations are not given]. Erythromycin stearate therefore seems to be effectively "antiamebic" and merits further test for this purpose.

A. R. D. Adams

JUNG, R. C., GARCIA-LAVERDE, A. & KATZ, F. F. **Fumagillin and Erythromycin in the Treatment of Amebiasis.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 989-97. [24 refs.]

Fifteen patients with amoebiasis were treated in Louisiana with 10 mgm. of fumagillin thrice daily for a week; 14 became free of *E. histolytica*, but 4 relapsed. Eight similar patients were treated with 600 mgm. of erythromycin every 6 hours for 7 days; all appeared subsequently to be sterilized of the infection. Sixteen similar patients, including some children, were given 30 mgm./kgm. body weight of erythromycin in 2 to 4 doses daily for 7 days; 5 apparently were not freed of their infections.

In Darien Province, Panama, 120 patients (chiefly children) with amoebiasis were treated with fumagillin, or with erythromycin, or with a combination of the two drugs. Of 39 treated with fumagillin alone 6

were not sterilized; all of 18 treated with erythromycin alone were sterilized; and of 63 treated with both drugs in varying proportions only one was not sterilized. The criterion of cure was stool examination, "if possible" 3 times within 10 days of completion of the treatment and again after 3 or 4 weeks.

In dealing with these cases of amoebiasis, infections with other intestinal parasites were disclosed. *Entamoeba coli* and *Iodamoeba bütschlii* infections seemed to vanish from most of those treated with erythromycin. Data in respect of the various protozoal and helminthic parasites are set out in a series of tables.

A. R. D. Adams

BOCK, Marianne & MUDROW-REICHENOW, Lilly. Experimentelle Untersuchungen über *Entamoeba histolytica*. [**Experimental Investigations on *Entamoeba histolytica***] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Oct., v. 6, No. 3, 344-7, 1 fig.

In order to throw light on the factors responsible for the infectivity and invasiveness of *Entamoeba histolytica*, the authors carried out investigations on experimentally infected rodents.

The object of one series of experiments was to ascertain the part played by the number of amoebae inoculated. For this purpose over 600 guineapigs were inoculated intracaecally with doses of culture containing from 96,000 to 2,200,000 amoebae. Of these animals 403 survived the operation and were killed 5 days later, when their caecum was examined and scored for amoebic infection and lesions. It was found that the number of amoebae inoculated bore no relation to the degree of infection and ulceration. From these experiments the authors conclude that the course of infection is determined by other factors, such as the concomitant bacterial flora introduced with the inoculum and that present in the caecum of the guineapigs.

In another series of experiments the authors studied the occurrence of amoebic abscess of the liver in guineapigs infected intracaecally with *E. histolytica*. In about 100 animals, usually killed on the 5th day after inoculation, pieces of the liver were removed and inoculated into diphasic culture medium, together with a few drops of a suspension of the original bacterial flora. Growth of amoebae was obtained in 40 per cent. of these cases, and it is noted that the majority of cultures were contaminated with bacteria. A definite correlation was found between the presence and degree of ulceration of the caecum in the infected animals and the proportion of positive liver cultures. Thus, when no lesions were present or amoebae were found only in the lumen of the caecum, no growth of amoebae was obtained in culture. However, apparently even the slightest lesion of the caecal wall enabled the amoebae to invade the liver, while more extensive ulceration increased the chances of metastasis, as shown by the results of cultivation. Similar experiments were conducted with rats, but in these animals liver invasion—revealed by positive culture—

was detected only once in 50 cases, in spite of extensive ulceration of their caeca.

From all these experiments the authors conclude that the invasiveness of *E. histolytica* depends largely on factors outside the parasite itself.

C. A. Hoare

BURROWS, R. B. & KLINK, G. E. *Endamoeba polecki* **Infections in Man.**

Amer. J. Hyg. 1955, Sept., v. 62, No. 2, 156-67, 3 figs. [23 refs.]

Up to 1954, 7 cases of human infection with so-called *Entamoeba polecki* had been recorded. To these the authors have now added 3 more, observed by them in the United States. They take this opportunity to describe and discuss the morphology, nomenclature and status of the parasite in question, on the basis of their own and previous materials and data.

Among the human entamoebae, *E. polecki* resembles *E. histolytica* more closely than others, but it differs from all of them in the production of uninucleate cysts. The nuclear structure of *E. polecki* varies, for in trophozoites it has a small, mostly eccentric karyosome, whereas in cysts it is large, consisting of a single compact structure or several granules, occupying a central or eccentric position. While the trophozoites "could be mistaken rather easily for *E. histolytica*", it is the cysts which provide the main differential characters. To those already referred to above should be added the presence in some cysts of a large "inclusion body" and of numerous small chromatoid bodies. The structure of *E. polecki* is illustrated in a number of figures.

E. polecki described from human beings is similar to certain entamoebae living in pigs (known variously as *E. polecki*, *E. suis* or *E. deblickei*) and in monkeys (*E. chattoni*). In discussing the nomenclature of the human amoeba, the authors defend the validity of the name *E. polecki* and its status as a human parasite, which in their opinion will prove to be more widely distributed than is at present realized. [See also this *Bulletin*, 1954, v. 56, 1250.]

C. A. Hoare

MEEROVITCH, E. **Experimental Infection of Chick Embryos with**

Entamoeba invadens. *Canadian J. Microbiol.* Ottawa, 1956, Feb., v. 2, No. 1, 1-5.

"*Entamoeba invadens* in chick embryos, incubated at 30°C., invaded and produced changes in the liver. The embryos did not survive more than six days at 30°C. after inoculation of the fluid medium, with or without *E. invadens*, and the inoculated amoebae did not survive the death of the embryo."

[See this *Bulletin*, 1955, v. 52, 641.]

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

MÖLBERT, Elisabeth. Elektronenmikroskopischer Beitrag zur Morphologie des Bewegungsapparates von Borrelien. [**An Electron Microscope Study of the Morphology of the Locomotory Apparatus of Spirochaetes**] *Ztschr. f. Hyg. u. Infektionskr.* 1956, v. 142, No. 3, 203-12, 10 figs. [25 refs.]

The author has studied the morphology of 3 species of relapsing fever spirochaetes—*S. recurrentis*, *S. hispanica* and *S. crocidurae*—by means of the electron microscope. In all 3 spirochaetes a band of fibrils was found, which is assumed to act as the locomotory organ. This band winds round the inner side of the spirochaete and forms a right-handed spiral. It is composed of 18 to 20 fibrils lying against the outer membrane. Sections of the spirochaetes showed the presence of a simple membrane, but it was not possible to interpret the nature of the various protoplasmic structures seen within the membrane.

[The somewhat indeterminate illustrations accompanying this paper are very liable to subjective interpretation, but some of them show the fibrils which have been described by previous authors (see especially BRADFIELD and CATER, *Bull. Hyg.*, 1952, v. 27, 972). The photographs of the sections are quite unintelligible to the abstractor.]

Edward Hindle

DAVIS, G. E. **A Relapsing Fever Spirochete, *Borrelia mazzottii* (sp. nov.), from *Ornithodoros talaje* from Mexico.** *Amer. J. Hyg.* 1956, Jan., v. 63, No. 1, 13-17, 1 fig.

YAWS AND OTHER TREPONEMATOSSES

D'MELLO, J. M. F. & KRAG, P. **Serological Studies of Yaws in Thailand.** *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 6, 1003-40, 4 figs.

This long article reports the results of a study of yaws in Thailand with special reference to its serology in relation to type of lesion and age of patient and the results of treatment. Two main areas were covered, Rajburi and Surindr. Lesions were classified into 6 types:

- Type I : initial lesions, multiple papillomata, "wet crab" yaws and other early skin lesions;
- Type II : hyperkeratosis, palmar and plantar;
- Type III : ulcerative;
- Type IV : bone and joint pains and lesions;
- Type V : latent;
- Type VI : other manifestations including gangosa, juxta-articular nodes, depigmentation.

The test used was the VDRL, supplemented occasionally by other flocculation tests. The cases analysed included 1,254 from Rajburi and 2,278 from Surindr.

Of type I, most of 159 and 118 cases, respectively, showed a high degree of positivity and similarity in different age-groups. Of type II, most of 544 and 541 cases also showed high positivity especially in the early age-group; there were, however, many sero-negatives in the 21-30 age-group, presumably "burnt-out cases". Of type III, 67 and 17 cases, 16.4 per cent. and 5.9 per cent. were sero-negative (? errors in diagnosis); the largest numbers gave titres of 1 in 64. Of type IV, 342 and 75 cases, 25.7 per cent. of the former and 12.8 of the latter were sero-negative suggesting that lesions were regressive; the highest titres were seen in the lower age-groups. Of type V, 38 and 1,489 cases, 18.4 and 15.5 per cent. respectively were sero-negative; serum reagin levels were usually low. Of type VI, 104 and 38 cases, 21 and 5.3 per cent. respectively were sero-negative; the higher titred cases were mostly in the upper age-groups.

Treatment consisted of 4 ml. of PAM in 2 injections (506 cases), 2 ml. in 2 injections (131 cases) and 4 ml. in 1 injection (264 cases); results showed little difference between the three with a bias in favour of the first; the total reversal to sero-negativity was 11.4 per cent.; types I, II and V showed a greater reduction in titre than III, IV and VI. In general it was found that high titres decreased rapidly in the first 6 months in the 8-32 age-groups, further decreases being slow.

The campaign has included a clinical survey of the population followed by treatment of all cases and contacts of infectious yaws; the possibilities of other methods of approach are considered.

There is an addendum on prozone phenomena in slide tests and it is suggested that these may be due to "reagin-like" substances in addition to the reagin of treponemal origin; malaria may be a factor.

Detailed results of titres and age-groups in the various types of yaws are set out in 27 tables.

T. E. Osmond

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

BECELLI, L. M. Simpósio sobre a epidemiologia e a profilaxia da lepra (1933-1953). [**Symposium on the Epidemiology and Prophylaxis of Leprosy**] *Rev. Brasileira Leprologia*. S. Paulo. 1954, Sept.-Dec., v. 22, Nos. 3/4, 157-230, 3 maps. [Numerous refs.]

This symposium begins with a study of the methods of making epidemiological studies and the difficulties generally experienced. There

follows a table of the prevalence of leprosy in the various countries of the world, including the source of knowledge, the date, the number of known cases of leprosy, the index per thousand, and the estimated number of cases in each country. Thereafter there is a study of the factors which favour the spread of leprosy: age, sex, race, complicating diseases, nutrition, social factors and climate. Under Prophylaxis are studied medical, social, educational and legislative factors as they concern leprosy. An account is given of recent advances in our knowledge of leprosy, such as treatment with sulphones and the possibility of converting the lepromin reaction by BCG. The influence of these new factors on the prophylaxis of leprosy is studied, but there are still serious difficulties in the way—the spread of infection by concealed lepromatous cases, technical and political difficulties, and economic and social difficulties. Next, some special methods recommended for control of leprosy in Brazil are discussed, such as accepting only those with a positive lepromin reaction for work entailing contact with leprosy, giving help to the families of patients so that they can make arrangements for isolation, obtaining the cooperation of medical practitioners in bringing concealed cases to light so that they may not continue to spread infection. Lastly, the question of sterilization of patients is discussed.

Ernest Muir

COCHRANE, R. G. **A Critical Appraisal of the Madrid Classification of Leprosy.** *Leprosy in India*. 1955, Oct., v. 27, No. 4, 234-40.

The history of the classification of leprosy is traced from the time of the early Scandinavian leprologists down to the time of the Madrid International Congress in 1953. The author then gives his views as to how the Madrid classification should be modified. (1) He adds a "silent phase", covering the period between infection and overt manifestation of the disease. (2) Patients with maculo-anaesthetic lesions which do not have the typical tuberculoid morphology should not be included under the tuberculoid type but in the indeterminate group, as long as there is no other provision made for them. (3) Stress is laid on the view that the dimorphous (border-line) group is very unlikely to transform into the tuberculoid type. Two tables are given, one indicating clinical differences in tuberculoid, lepromatous and dimorphous macules, and the other detailing histological and immunological differences in these 3 types of lesions.

Ernest Muir

TRESPALACIOS, F. & PIÑEYRO, R. Estudio de la placenta y del cordón umbilical en veintisiete casos de lepra. [**Study of the Placenta and Umbilical Cord in Twenty-Seven Cases of Leprosy**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1955, Sept., v. 12, No. 3, 156-60. [17 refs.]

The authors examined the placenta and cord of 27 children of leprous patients, 23 of which parents suffered from the lepromatous type. All

the specimens were negative for lepra bacilli in the sections examined. Seventeen of these children were examined at a later date, and all had remained healthy. These findings are compared with those of other workers who have reported finding bacilli in the placenta and cord. A theory is mentioned that there is an immune globulin formed in pregnancy which protects the foetus, or that the foetal tissues have power to destroy any bacilli which may reach them.

Ernest Muir

TIANT, F. R. Diagnostico precoz de la lepra. [**The Early Diagnosis of Leprosy**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1955, Sept., v. 12, No. 3, 134-43.

The author takes the view that while bacteriological and histological examinations are useful in some cases, the main reliance in diagnosing early leprosy should be placed on a careful clinical examination. In doubtful macules the histamine and pilocarpine tests are recommended. A description is given of the rare conditions of lazarine leprosy, where lepra bacilli can be found in large numbers in the necrotic skin but not in any other part of the body. The ulcers left have a tendency to heal, leaving deep anaesthetic scars. Under early neural changes those of sensory, motor, and trophic nature are carefully described; there are also early changes in the bones and joints of the extremities, and in the sweat glands. Several of the diseases likely to be mistaken for leprosy are mentioned and the differential diagnosis is made clear.

Ernest Muir

RUGE, H. **Serological Findings in Leprosy and Tuberculosis with the Wassermann, Meinicke, and VDRL Tests.** *Bull. World Health Organization.* Geneva. 1955, v. 13, No. 5, 861-86. [34 refs.]

Sera from 820 patients with leprosy and 720 with tuberculosis in Egypt were tested by the Wassermann (WR), Meinicke (MKR II) and VDRL tests. Detailed results are set out in 14 tables. Syphilis was considered to be present in 31 of the leprosy patients and in 37 of the tuberculous patients; in the former group there were 12 males (2.5 per cent.) and 19 females (5.7 per cent.); in the latter group 16 males (5.5 per cent.) and 21 females (4.9 per cent.). [Some patients were diagnosed as syphilitic on the results of serum tests only.] On the other hand 203 of the leprosy cases (25 per cent.) and 38 of the tuberculosis patients (5 per cent.) were considered to have given false positive reactions; in leprosy it was found that those with active or relapsing lesions gave more false positive reactions than those with inactive or latent forms; a fair proportion of sera from leprosy patients were found to be anticomplementary.

Results showed that the Meinicke reaction was the most specific, followed by the WR and VDRL in that order. It is evident that a good

deal depends on the type of antigen used; crude antigens seem likely to give more false positive reactions than purified ones. It is suggested that the considerable amount of tissue breakdown which may occur in both diseases may be an important factor in producing false positive reactions. The suggestion is put forward that an increase in serum-cholesterol and fatty acids in these diseases may result in the formation of a reagin.

Findings showed that syphilis was commoner in males with tuberculosis than in those with leprosy and that more females than males with leprosy had syphilis, while in tuberculosis the syphilis incidence was much the same in males and in females.

The findings of several other investigators are given and there is an extensive bibliography.

T. E. Osmond

SWERTS, L. Tests à la tuberculine et à la lépromine dans la Chefferie Makoda. [**Tests with Tuberculin and Lepromin in the Makoda Chieftdom**] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 801-4, 1 chart.

Preliminary to BCG vaccination in the Makoda Chieftdom, Belgian Congo, tuberculin and lepromin tests were made on the population. For the Mantoux test a dilution of 1 in 1000 was used and readings made after 48 hours. Positive readings were recorded in those with 10 to 20 mm. of infiltration and upwards. For the lepromin test an antigen was used composed of a suspension of 0.4 gm. of dried leproma per 100 cc. of saline. Positive reactions were counted when a nodule was formed of over 4 mm., the reading being made after 3 weeks.

The Mantoux and Mitsuda reactions were compared, and also those of males and females in each of these categories. The results are shown in curves. The tuberculin curve increases at first very slowly up to the 6-10-year age-group, accelerates in the 11-15 age-group, then rises abruptly from the age of 16 to 20. Up to 15 years the curve of the 2 sexes is practically the same, but after that the male curve rises more quickly than the female. They stop rising when 50 to 60 per cent. have become positive at the age of 36 to 40 years, but the curve for the men rises somewhat higher than that for the women. The lepromin curves are quite different. There is no initial latent period, and they rise much more abruptly, the 2 curves overlapping till a maximum is reached of 65 to 75 per cent. positive at the age of 16 to 20 years.

The two main differences between the tuberculin and the lepromin reactions are: (1) the absence in the lepromin curve of the initial latent period before it starts to rise, and (2) the more abrupt rise of the lepromin curve, so that it reaches the maximum earlier and at a higher percentage level. This is explained by the supposition that the people in this region are impregnated with leprosy at an earlier age than with tuberculosis.

The fact that the lepromin reaction is converted earlier than the tuberculin does not support the idea that the conversion of the lepromin reaction is due to the tubercle bacillus.

Ernest Muir

LECHAT, M. & CHARDOME, J. Altérations radiologiques des os de la face chez le lépreux congolais. [**Radiological Changes in the Bones of the Face in Leprous Patients in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1955, Oct. 31, v. 35, No. 5, 603-11, 2 figs. on 2 pls. [16 refs.]

The particular change referred to is disappearance of the nasal spine. This deformity has been described chiefly by Norwegian leprologists [see this *Bulletin*, 1953, v. 50, 424]. The authors refer to 96 leprosy patients isolated in the Yonda-Coquilhatville leprosarium. Out of 64 lepromatous patients this change was noted radiographically in 50. Of 32 not lepromatous 7 had the deformity. The possible causes are discussed. There is no reason to think that the cause is racial, nor can it always be associated with changes in the nose detected by rhinoscopy, such as atrophic rhinitis, perforation of the septum, other forms of rhinitis, ulcers of the septum or lepromas inside the nasal passages. It cannot be associated with syphilis, as radiograms in that disease do not show disappearance of the nasal spine.

It is concluded that the disappearance of the nasal spine is in some way connected with the disease in the mucous membrane of the nose and the perforation of the cartilaginous septum of the nose. Whether it can occur early in leprosy or is always a late sign it is at present difficult to say.

Ernest Muir

RELVICH, A. L. **Relapses in Lepromatous Leprosy.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 97-101.

The author deals with an average population of 5,500 leprosy patients in Nigeria, of whom 800 are in the central settlement and the remainder in segregation villages. In the former about 60 per cent. are lepromatous, in the latter about 25 per cent. All are on sulphone treatment. Of the lepromatous patients in the settlement: (1) 39 have been discharged "symptom free"; (2) 17 became negative more than 2 years ago but have been kept in the settlement because of extensive trophic lesions and continued with sulphone treatment; (3) 21 became negative 18-24 months ago; (4) 23 have been negative for 12-18 months; (5) 52 became negative 6-12 months ago; (6) 41 have been negative for less than 6 months. On examination of these 6 groups, new macular lesions have been found in the following numbers respectively: 4, 6, 3, 3, 4, 1. With the exception of the first group, all had been kept in the settlement under treatment.

It has been noted that "it does not matter whether the patient has had the nodular form of lepromatous leprosy, the infiltrated or the macular form, he is liable to develop fresh macules, but up to now only macules". With few exceptions "the lepromin test remained negative". The macules showed, histologically, characteristics of both lepromatous and tuberculoid forms of leprosy.

Patients are retained in the settlement until they have been "negative" for 2 years, but in view of the liability to relapses it is considered that it may be necessary to keep them on sulphones all their lives. [Unfortunately details are not given of the routine followed in determining that the patients are "negative". Provided that the same standards are followed as at Uzuakoli in the Eastern Region of Nigeria, where relapses are much less frequent, it would appear that leprosy is of a more intractable nature in the part of the Western Region from which the author's patients are drawn.]

Ernest Muir

GARCÍA MIRANDA, A. & PIÑEYRO RODRÍGUEZ, R. Lepra tuberculoide ulcerosa (lazarina). Reporte de un caso. [**Report of a Case of Ulcerating Tuberculoid ("Lazarine") Leprosy**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1955, Sept., v. 12, No. 3, 161-75, 8 figs. [11 refs.]

GONZÁLEZ PRENDES, M. A., VALHUERDI FERNÁNDEZ, C. & CRUZ BÁEZ, R. La atebrina en el tratamiento de la reacción leprótica. [**Atebrin [Mepacrine] in the Treatment of Lepra Reaction**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1955, Sept., v. 12, No. 3, 194-9.

In 12 cases of acute lepra reaction treatment with 0.3 gm. of mepacrine daily for 7 days caused spectacular disappearance of the reaction. All the patients were examined for malaria with negative results. Further trial of this method of controlling reaction is suggested. Ernest Muir

COCHRANE, R. G. **The Treatment of Leprosy.** *Arch. Intern. Med.* 1956, Feb., v. 97, No. 2, 208-14. [14 refs.]

Special reference is made to the work of KHANOLKAR [this *Bulletin*, 1952, v. 49, 56] regarding the entrance of lepra bacilli into the body. "Once the organism gets into the skin, it appears to make its way to the axon-plasma filaments—the ultimate terminals of the nerves to the skin. From here *M. leprae* enters the axis cylinder and, probably by multiplication, gradually ascends the nerve. In the majority of instances, if pathological lesions of leprosy develop, the *M. leprae* organisms 'burst'

out from the axis cylinder into the corium of the skin, and the type of leprosy which develops has a direct relationship to the type of cellular response stimulated by the presence of *M. leprae*."

The author goes on to describe the history of sulphone therapy. He is opposed to using hydnocarpus esters as a suspending agent when injecting sulphones, but considers that hydnocarpus esters in doses of 5 cc. twice a week, injected intradermally into skin areas still showing bacilli, is a useful addition to sulphone treatment in clearing up the infection. He finishes by mentioning work that is being done to prevent and relieve mutilations by orthopaedic and physiotherapeutic measures.

Ernest Muir

SWERTS, L. Considérations sur les traitements sulfonés de la lèpre. [**Sulphone Treatment of Leprosy**] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 785-800.

The author, working at the Belgian Congo Red Cross anti-leprosy centre at Nepoko, reviews the treatment of 2,500 tuberculoid cases of leprosy and 800 lepromatous cases over a period of 3 years. Tuberculoid macules had disappeared more or less completely in 90 per cent. The improvement of thickened nerves was more difficult to assess as the thickness might diminish without any corresponding improvement in sensation; there was, however, a gradual improvement in about 40 per cent. of patients over the 3 years. Much better results as regards function were obtained in patients with only a single tuberculoid lesion than in those with multiple lesions. With the lepromatous type there was definite improvement in the skin lesions in 90 per cent., though the nerve lesions were little improved. The bacteriological findings had become negative in 11.24 per cent., and very much reduced in 37.85 per cent., by the end of the 3 years.

The results are shown in detail in several tables.

Ernest Muir

DHARMENDRA & CHATTERJEE, K. R. **Hydnosulfone in the Treatment of Leprosy.** *Leprosy in India.* 1955, Oct., v. 27, No. 4, 230-33.

Hydnosulfone is a condensation product of hydnocarpic acid with DDS. It is a slightly yellowish powder with a molecular weight of 716, and a melting point of 122°C. It is insoluble in water and ether. It is similar to Chaulfone, a French preparation, but differs in retaining the original saturated group. It is well tolerated, does not produce any toxic effects, and does not break down into its component parts in the body when taken orally. It was found too irritant for intramuscular injection. In only 4 out of 26 patients treated was there a slight initial reduction in erythrocytes and haemoglobin. There was, after treatment varying from

30 to 100 weeks' duration, complete or almost complete clinical subsidence in 8 of the 18 lepromatous patients, 3 of them becoming bacteriologically negative. In 6 others there was considerable clinical and bacteriological improvement. In 7 tuberculoid cases there was subsidence of erythema and thickening. Most of the patients included in this trial had previously been treated without any, or lasting, effect. It is concluded that Hydrosulfone is of definite value in the treatment of leprosy, particularly in patients who cannot tolerate, or do not make satisfactory progress with, some other drugs, such as DDS, isoniazid or thiosemicarbazone.

Ernest Muir

LAURET, L. & KERBASTARD, P. Traitement des rhagades ulcères et perforants lépreux par l'association d'acide trichloracétique et d'acide salicylique. [**Treatment of Ulcerating Fissures and Leprous Perforating Ulcers with a Combination of Trichloroacetic Acid and Salicylic Acid**] *Méd. Trop.* Marseilles. 1956, Jan.-Feb., v. 16, No. 1, 83-92.

At the Marchoux Institute for leprosy 20 per cent. of patients suffer from trophic lesions of the extremities. Deep fissures of the heel, of the toes and between the digits, occur both in the dry and in the wet weather. Perforating ulcers are the most frequent and intractable trophic lesions. With good food and sulphone treatment patients make remarkable improvement, but the ulcers do not show equally favourable results.

The remedy tried was either a glycerin solution or an ointment of trichloroacetic acid and salicylic acid (ATS), 3 per cent. of the former and 0.5 per cent. of the latter. Seventy leprosy patients with fissures of the feet were treated morning and evening for 10 minutes in foot-baths containing the glycerin solution. Within 15 to 45 days all the fissures closed and the hyperkeratosis diminished, although the patients continued to cultivate their fields during treatment. A second group of 39 patients, of whom 8 had fissures, 23 had perforating ulcers and 8 had other ulcers, were treated with poultices of ATS for 8 days, followed by the ATS ointment. Of the 42 perforating ulcers affecting the above 23 patients 14 healed, 10 improved and 4 improved slightly. Of 17 perforating ulcers treated by this method combined with daily intravenous injections of Dycholium (dehydrocholate of sodium) [this *Bulletin*, 1955, v. 52, 1099] 7 healed, 5 were improved and 2 were slightly improved. The superior results from this combined treatment are attributed to the antiseptic and epithelium-softening actions of the acids, and the vasodilatation brought about by the bile salts.

Ernest Muir

LESCANO, O. La cirugía plastica de la lepra. [**Plastic Surgery in Leprosy**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1955, Sept., v. 12, No. 3, 184-91, 14 figs.

PARDO-CASTELLÓ, V., TIAN, F. R. & IBARRA PÉREZ, R. El valor de la calmetización en la profilaxis de la lepra. [**The Value of Vaccination with BCG in the Prophylaxis of Leprosy**] *Bol. Soc. Cubana de Dermat. y Sifil.* 1955, Sept., v. 12, No. 3, 144-53. [44 refs.]

Twenty-two children with negative Mitsuda reactions were given 100 mgm. of BCG by mouth once a week for 3 weeks. Three weeks after the vaccination the Mitsuda reaction was positive in 9 and negative in 13. Of these 22 children 15 were the children of leprous parents, but had been separated from their parents at birth. These 15 were given another similar 3-week course of BCG. Three weeks after this revaccination the Mitsuda reaction had become positive in 5 who had been negative before; in 4 who had been positive or doubtful before the reaction had become negative; and in the other 6 cases the reaction remained the same.

It is acknowledged that these results are not as good as those obtained by some workers, though they correspond to those found by others. The authors still consider that BCG increases resistance to leprosy and uphold its universal use where leprosy is endemic.

Ernest Muir

HOBBY, Gladys L. & DONIKIAN, Mary A. **The Intermittent Use of Streptomycin and Isoniazid Singly and Together in Murine Leprosy.** *Amer. Rev. Tuberculosis.* 1955, Dec., v. 72, No. 6, 846-50, •3 figs.

The technique previously described [this *Bulletin*, 1954, v. 51, 808] in which the effect of treatment is assessed by the number of *M. leprae murium* in smears of spleen homogenates from mice infected intraperitoneally, was used for this assessment. The drugs, streptomycin sulphate 2·7 mgm. and isoniazid 0·63 mgm., were given singly and in combination in equivalent doses as streptomycylidene isonicotinylhydrazine. The drugs were given subcutaneously, starting 14 days after infection. The spleen counts were made at various intervals.

Groups of 10 mice were given the drugs once weekly; twice weekly; daily for 5 days each week, each alternate week, each alternate fortnight, each alternate month and each week for 1 month every 3 months. The results are presented graphically. They show that streptomycin had only a slight bacteriostatic effect when given 5 days each week, each alternate week or each alternate fortnight, and that action is only temporary, owing, the authors consider, to the development of resistance. Isoniazid had a marked inhibitory effect in all the groups, *i.e.* even when given only very occasionally. In the group in which isoniazid was given for 1 month in every 3 months, the count rose during the 2 months in which no drug was given but fell again when treatment was resumed. The results with combined treatment were similar to those when isoniazid was used alone.

The authors emphasize that these results may not apply to human leprosy but that they may have a place in experimental tuberculosis.

S. R. M. Bushby

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllbothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

CINTRA, J. F. & RUGAI, E. Helminthíases entre escolares da cidade de Bauru. [**Helminthiasis in Schoolboys in Bauru, Brazil**] *Rev. Inst. Adolfo Lutz*. S. Paulo. 1955, v. 15, 155-7.

The English summary appended to the paper is as follows:—

“Faeces of 2879 schoolboys from 4 to 14 years old were examined. Positive cases of helminths amounted to 73·3%. There were found 56·0% for Ancylostomidae; *A. lumbricoides*, 19·3%; *T. trichiura*, 19·0%; *S. stercoralis*, 15·3%; *H. nana*, 4·6%; *E. vermicularis*, 1·7%; *Taenia* sp., 1·1%; Trichostrongylidae, 0·6%.”

STEWART, J. S. **Anthelmintic Studies: I. A Controlled Critical Enteronemacidal Test.** *Parasitology*. 1955, Nov., v. 45, Nos. 3/4, 231-41. [19 refs.] **II. A Double Enteronemacidal Anthelmintic Test covering a Wide Range of Activities.** *Ibid.*, 242-54, 1 fig. **III. A Taeniacidal Testing Technique.** *Ibid.*, 255-65. [22 refs.] **IV. The Loss of Efficiency by Division of the Dose.** *Ibid.*, 266-8.

I. Having reviewed the existing techniques for the testing of anthelmintic substances, the author gives reasons for his choice of test infections for his investigations. For an experimental animal the rat was chosen and its infection with *Heterakis spumosa* combined with *Nippostrongylus muris*, it was believed, would give a much wider range of helminth reactions to anthelmintics than would a single infection. The mode of infection of rats with *H. spumosa* is described; also the development of worms in relation to infective dose and the normal evacuation of worms by untreated animals.

In appraising the different types of *in vivo* anthelmintic tests, namely, the worm egg-count method, the critical anthelmintic test (Hall's method) and the controlled anthelmintic test, the author concludes that a combination of Hall's method and the controlled anthelmintic method is to be preferred. This is termed “controlled critical anthelmintic testing” and is described for the first time. It has the advantage of detecting both “direct” and “indirect” activity of the drug under test.

For the interpretation of anthelmintic activity, two formulae are used which express the result as percentages. One gives the value of "direct" and the other of "indirect" activity. Different degrees of activity are defined as follows: very active—over 80 per cent.; active—over 60 per cent.; moderately active—41–60 per cent.; slightly active—30–40 per cent. The value of the use of direct activity together with indirect activity in interpreting results is illustrated by a test with phenothiazine. The response of *H. spumosa*, by the technique described, to a number of known anthelmintics which have been used against *Enterobius* is illustrated in tabular form.

II. In this section the author describes the use of *N. muris* as a test organism, with an account of its life cycle, and some test results illustrating its response to tetrachlorethylene, *n*-butyl chloride and phenothiazine. A comparison of *n*-butyl chloride with *n*-butyl bromide showed that the latter appears to be more active. The use of *N. muris* together with *H. spumosa* as a wider range anthelmintic test is also described. (Previously it had been shown that these two infections had no marked effect on one another when in the same host.) Some test results are described and tabulated.

A detailed description is given of the procedure adopted in dealing with large numbers of animals under test in the most efficient manner.

III. For investigating the effects of substances against cestodes the test infection of choice was *Hymenolepis nana* var. *fraterna*, in its natural host, the mouse. The technique of infecting mice with this tapeworm and of their treatment with speculative compounds is described in detail. In the interpretation of the activity of the compounds a form of computation is used which is based upon the numbers of worms and differences in the size of worms. The interpretation of results is illustrated by test examples. The response of the test organism (*H. nana* var. *fraterna*) to 3 known active compounds, mepacrine, 2,2-dihydroxy-dichlorophenyl-methane and male fern, was investigated and compared with the recorded response of *T. saginata* in man and of *Taenia* sp. in dogs.

IV. By means of the technique described in Section I a comparison was made between the effects of a single effective dose (phenothiazine) and of its division into smaller parts. "Where the total of the divided dosage is $1\frac{1}{2}$ times the single dose the effect does not appear to be reduced if it is given in three doses at one dose per day for 3 days; it appears a little reduced where $1\frac{1}{2}$ times the single dose is given as five doses spread over $2\frac{1}{2}$ days. At 1 dose per day for 5 days similar dosage has appreciably less effect. . . .

"It appears that a suitable concentration of anthelmintic requires to be attained over a short period to attain optimum effect; a lower concentration over a more extended period is less effective."

J. J. C. Buckley

NAGATY, H. F., RIFAAT, M. A. & SALEM, S. **A Preliminary Report of the Anthelmintic Properties of Two Piperazine Compounds—Piperazine Adipate (Entacyl, B.D.H.) and Piperazine Citrate (Antepar, B.W.).** Reprinted from *Bull. Clin. & Scient. Soc. Abbassiah Facul. of Med.* 1955, Oct., v. 6, No. 2, 5 pp. [11 refs.]

“Two Piperazine compounds, Piperazine citrate and Piperazine adipate were tested for their anthelmintic properties against *Ascaris*, *Ancylostoma*, *Trichostrongylus*, *Trichocephalus*, *Enterobius*, *Heterophyes*, *Hymenolepis nana*, and *Taenia saginata*.

“Single doses of 3–5 grams of the citrate or 4.5 grams of the adipate were found ineffective against *H. nana*, *Taenia saginata*, and *Ancylostoma*. 8.1 grams of the adipate given over 3 days to one adult patient and 8.5 grams of the citrate to another had no effect on *Ancylostoma*. With the same single dosage expulsion of worms was obtained in cases infected with *Ascaris* and *Trichocephalus* although radical cure could not be obtained in every case. Some cases of Ascariasis had to be treated more than once, up to 3 times in one case without completely eradicating the infection. Cases of *Trichostrongylus* infection could be radically cured with single doses of either drug. Cases of *Heterophyes* infection after one week courses of either drug were negative for ova. The authors lay stress upon the fact that these new drugs affect such parasites as *Trichostrongylus* and *Heterophyes* which have been known to be difficult to treat with previously known anthelmintics. In *Enterobius* the drugs were found very effective when given over a week although radical cure could not be achieved as recurrences occurred 20 days after the end of the treatment. Repeating the course of treatment resulted in cure.”

WATSON, J. M. **Studies on Bilharziasis in Iraq. Part X. Incidence and Epidemiology in the City of Basrah.** Reprinted from *Al-Mihan Al-Tibbiyah*. Baghdad. 1953, v. 1, No. 3, 2–31, 1 map. [18 refs.]

This paper summarizes previous investigations into schistosomiasis in Basrah and records the author's recent findings. The city and surrounding area are irrigated from a series of channels arising from the estuary formed by the junction of the Tigris and Euphrates rivers some 60 miles from the sea. The incoming tide dams back the river water, raising its level several feet and causing a flow along the irrigation canals.

The examination of urines for ova was carried out mainly among schoolchildren and the inhabitants of hut settlements in the poorer parts of the city. Ova of *Schistosoma haematobium* were found in 32.2 per cent. of 4,252 persons. The incidence in different schools varied from 8 to 36.9 per cent.; although a number were in vector-free areas, infected boys admitted to bathing in known infected canals. The present incidence is lower than in a 1925 survey [this *Bulletin*, 1926, v. 23, 244], probably because pure water is now available, sanitation has improved

relatively, much propaganda has been carried on and free treatment provided. The hut settlements, with one exception, lay in close proximity to canals in which there was frequent contact between vector snails and the local population. Among 775 of the inhabitants ova were found in 40.9 per cent. Communities close to the estuary showed a lower infection rate than others further away in the same area, possibly because they preferred to use the uninfested estuary rather than the canal water. The higher incidence in the hut dwellers is attributed to their poverty and proximity to infested water courses, while the schoolchildren were derived from all social classes and all parts of the city.

Snail surveys were made systematically, particularly during the season when prevalence was expected to be greatest. *Bulinus truncatus* was present in only 5 of the 20 channels in and around Basrah. Previous investigators had found the snails in the pools at the ends of some of the main channels and in the distal parts of the irrigation system, but the present survey revealed them in the main channels and proximal branches. It is suggested that the increase in motor transport and decreasing use of shipping in the large canals, by reducing agitation in the water and permitting increase of water vegetation, may have enabled the snails to become established in the new sites. Vector snails were concentrated in the central area of the city and this corresponds with the main distribution of human infection. The absence of *Bulinus* from the southern half of Basrah province, in spite of apparently suitable ecological conditions, may possibly be due to occasional increases of salinity (over 400 parts of dissolved chlorides per 100,000) which may last for a few days. The paper concludes by outlining some subjects for local research and suggestions for improving control. [For Part IX of this series, see this *Bulletin*, 1955, v. 52, 275.]

T. H. Davey

GADGIL, R. K. & SHAH, S. N. **Human Schistosomiasis in India. Infection of Snails with *Schistosoma haematobium*.** *Indian J. Med. Sci.* 1955, Oct., v. 10, No. 10, 586-91.

The endemic focus of human vesical schistosomiasis in India is at Gimvi in the Ratnagiri district, near the Konkan coast, South of Bombay. The snails are found in a rivulet which passes through the village. During the monsoon, when the rivulet is in flood and the snails scarce, the villagers use well-water, but after the monsoon, when well-water falls, more and more use is made of the rivulet. Reduced flow at this time corresponds with increase in snail breeding and the rivulet is believed to remain infective from March to June.

Planorbis helisoma, *P. torquis* and *Limnaca luteola* were collected from Bombay suburbs and exposed to infection together with *Paludomus obesa* and *Ferrissia tenuis*, which were either laboratory bred or collected from the endemic locality. Numbers of miracidia employed varied from

unstated large numbers to 4-5 per snail. All wild snails were kept for one month before exposure to infection. Of these snails, only *F. tenuis* produced furcocercous cercariae. Of 490 specimens exposed, 13 survived the incubation period and, of these, 7 shed cercariae. A further 3,000 *F. tenuis* have been exposed, apparently with some degree of success, but results are not reported. The authors consider *F. tenuis* to be the most likely local vector of schistosomiasis. [This is the first instance where a member of the Ancyliidae has been incriminated as a vector of human schistosomes. The authors would be well advised to pursue their proposed attempts to establish the mammalian phase in experimental animals.]

O. D. Standen

SHAH, S. N. & GADGIL, R. K. **Human Schistosomiasis in India. The Study of Snails.** *Indian J. Med. Sci.* 1955, Oct., v. 9, No. 10, 592-6.

In 1952, the authors reported the first known focus of human schistosomiasis in India [this *Bulletin*, 1953, v. 50, 317]. The present paper makes some observations on the molluscan fauna of the locality. The three snails found were *Paludomus obesa* (Melanidae), *Ferrissia tenuis* (Ancyliidae), and *Indoplanorbis exustus* (Planorbidae). Attempts were made to culture *P. obesa* and *F. tenuis*. Running water was found to be essential and artificial aeration advisable. Under these conditions *F. tenuis* started breeding satisfactorily.

O. D. Standen

MARILL, F. G. Note sur le comportement de *Bullinus contortus* Mich., dans les conditions naturelles, en présence de composés azotés. [**Behaviour of *Bullinus contortus* under Natural Conditions in the Presence of Nitrogenous Compounds**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 661-3.

HALAWANI, A. & TAMAMI, M. **Preliminary Report on the Cytological Diagnosis and Incidence of the Bilharzia-Cancer of the Bladder in Egypt.** *J. Egyptian Med. Ass.* 1955, v. 38, No. 8, 455-65, 4 figs. (2 coloured) on 3 pls.

In Egypt it is believed that vesical schistosomiasis is the primary cause of the vesical cancer which, there, is the most common form of malignant disease in male agricultural workers. Biochemical toxins produced by ova and the worms, secondary sepsis and alkalinity of the urine, a diminution of oxygen supply and impediment of the circulation, by fibrosis and calcification, are among the explanations advanced for its genesis

[this *Bulletin*, 1955, v. 52, 794]. The type of vesical cancer most seen is the squamous-cell; the transitional-cell type is next most frequent, but undifferentiated types also occur; sarcomata are rare.

The authors saw 15 male patients with vesical carcinoma during 1954; all had old-standing vesical schistosomiasis. Early diagnosis of bladder carcinoma is not easy where there is also this disease. Cystoscopy often is not possible owing to the circumstances, and X-ray examination is unreliable. Cyto-diagnosis, or search for cancer cells in the urine, offers the advantage of simplicity. The passage of the cells in the urine depends on the type and size of the tumour, its activity and its type. Characteristically the cells appear in groups and show anisocytosis, anisonucleosis, multinucleosis, and hyperchromatosis. They are heterogeneous, and often are vacuolated and amoeboid; their nuclei are irregular in size, form and number, and in chromatin content; irregular mitotic division may be seen. The cells stain intensely. A satisfactory stain is 1 per cent. neutral red in 96 per cent. alcohol. One drop of urinary deposit is mixed with a drop of the stain on a slide, left for 5 minutes and then examined, under a cover glass, with the dry lenses of the microscope. Acetic-acid-alum-carmines may alternatively be used in a similar manner. Urines should be examined on 3 or 4 consecutive days, as the shedding of tumour cells is intermittent. Coloured illustrations and photomicrographs illustrate the results.

Of urines of 1,001 patients examined in this manner 5 were found to contain malignant tumour cells; 526 of the patients had vesical schistosomiasis and 475 had not. All the 5 patients passing the characteristic cells were among the 526 patients infected with schistosomiasis. The diagnosis was confirmed by subsequent cystoscopy, X-ray and other examinations. This cyto-diagnostic procedure is a useful preliminary routine in the detection of bladder cancer.

A. R. D. Adams

BADRAN, A., EL ALFI, O., PFISCHNER, W. C., KILLOUGH, J. H. & BURNS, T. W. **The Value of Routine Rectal Biopsy in the Diagnosis of Schistosomiasis.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1068-71.

In the present study rectal biopsy was performed on 100 patients consecutively admitted to the U.S. Naval Medical Research Unit, Cairo. The patients were male Egyptians admitted for a variety of illnesses other than schistosomiasis and ranged in age from 17 to 50.

Routine urine examination was positive in 20 per cent. of the 338 specimens examined; 33 out of the 100 could have been diagnosed by this method alone. Of 61 patients found by rectal biopsy to have schistosome eggs, 52 had *S. haematobium* only, 1 had *S. mansoni* only, and 8 had both *S. haematobium* and *S. mansoni*. In 32 the rectal biopsy was positive when examination of 24-hour urine specimens had been negative.

Conversely, in only 3 patients were eggs discovered in concentrated urine specimens when a rectal biopsy had been negative.

Philip Manson-Bahr

DIMMETTE, R. M. & SPROAT, H. F. **Recto Sigmoid Polyps in Schistosomiasis. I. General Clinical and Pathological Considerations.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1057-67, 11 figs. [18 refs.]

A total of 159 polypoid lesions were recovered by surgery or at necropsy and were studied in Cairo. The polyps varied considerably in size from 2 mm. to 20 mm. and from 2 mm. to 24 mm. in length. The smaller polyps were sessile and as they increased in size so a pedicle could be seen. The larger ones were usually pedunculated. Those of long duration and from patients treated with antimony preparations revealed the greatest degree of fibrosis.

The forms of schistosomes present in the polyps were used as the means of identification: the polyps were found in 17 to 20 per cent. of cases.

Patients with polyp formation of the rectosigmoid colon, associated with schistosomiasis, ranged from 19-40 years of age and their symptoms were referable to the rectum and colon. The most frequent symptoms were rectal bleeding and tenesmus.

The majority (74.8 per cent.) of the polyps contained eggs of the *S. mansoni* type, whereas in 30.2 per cent. they were those of *S. haematobium*. In only 3 were adult worms present, indicating that migration into a polyp is rare. The high percentage of polyps containing eggs of *S. mansoni* type agreed with their predominance in rectal scrapings and biopsy of the rectal mucosa.

The microscopic pathology of the polyps is described in detail and illustrated in 10 photomicrographs. Figures are given for the incidence of recto-sigmoid polyps associated with schistosomiasis in other Egyptian hospitals.

Philip Manson-Bahr

MILLER, M. J. & LYON, H. P. **Treatment of Vesical Schistosomiasis with Stibophen.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1049-56, 2 figs.

Patients studied were plantation workers in Liberia. All were adult males infected with *S. haematobium* but were living in a schistosome-free area with no opportunity for re-infection. The following 5 treatment schedules with intramuscular stibophen were tested.

Schedule A: 4 cc. on alternate days for 10 injections; total dosage 40 cc. administered over 20 days.

Schedule B: 5 cc. for four consecutive days, repeated after a treatment-free interval of four days; total dosage 40 cc. administered over 12 days.

Schedule C: 5 cc. the first day, 6 cc. the second and 7 cc. the third, with a six-day treatment-free period followed by 7 cc. and 8 cc. on two consecutive days; total dosage 33 cc. administered over 11 days.

Schedule D: The drug was injected on each of two successive days and repeated after a treatment-free period of two to four days. Treatment was completed in six to eight days. Dosages were based on the patient's weight and were calculated thus: 140 lb. or over, 10 cc. at each dose—total dosage 40 cc.; 120–139 lb., 9 cc. each dose—total dosage 36 cc.; 100–119 lb., 8 cc. each dose—total dosage 32 cc.; 80–99 lb., 7 cc. each dose—total dosage 28 cc.

Schedule E: Daily injections on each of three successive days and dosage calculated on a weight basis as in Schedule D. Depending on the weight of the patients, total dosages varied from 21 cc. to 30 cc. and the treatment was completed in three days.

All the 207 patients were ambulatory. The effectiveness of treatment was determined in each case by urine examinations continued whenever possible for 6 months.

Untoward reactions included anorexia, nausea, vomiting and a maculopapular pruritic eruption. They were correlated with size and frequency of individual doses, but not necessarily with the total dose.

Daily ultramuscular injections of stibophen given for 2 successive days and repeated after 2 to 4 treatment-free days, as in Schedule D, proved to be relatively efficient in curing cases of vesical schistosomiasis (79 per cent.), and it was, moreover, the most convenient treatment régime to administer to large numbers in the field, and while the incidence of vomiting was high, untoward reactions did not interfere seriously with successful completion of treatment.

Rates of cure, based upon the clearance of all schistosome eggs from the urine by the sixth post-treatment month, ranged from 50 to 79 per cent.; with adequate total dosage the more intensive treatment régimes gave the higher cure rate.

Philip Manson-Bahr

TARIZZO, M. L. **Schistosomiasis in Saudi Arabia. Treatment with Lucanthone Hydrochloride (Nilodin) and with Sodium Antimonyl Gluconate (Triostam).** *Amer. J. Trop. Med. & Hyg.* 1956, Jan., v. 5, No. 1, 145–9. [12 refs.]

“In *Schistosoma mansoni* infections in Saudi Arabia a cure was obtained in 6 out of 12 cases with lucanthone hydrochloride (Nilodin) in dosages of 55 to 75 mg./kg. body weight, and in 12 out of 18 cases with sodium antimonyl gluconate (Triostam) in dosages of 13 to 21.6 mg./kg. body weight. In *S. haematobium* infections, one case was cured with 110 mg./kg. of lucanthone hydrochloride and 4 out of 4 cases were cured with 20 to 24 mg./kg. of sodium antimonyl gluconate.”

HONEY, R. M. & GELFAND, M. **Ileo-Cystoplasty in Chronic Bilharzial Cystitis.** *Central African J. of Med.* 1956, Jan., v. 2, No. 1, 1-5, 4 figs.

"Ureterectasis as a complication of schistosomiasis and in the absence of stenosis is discussed.

"It occurs in two forms:

"(a) In patients with bladders of normal capacity.

"(b) In patients with chronic bilharzial interstitial cystitis in whom the bladder capacity is reduced;

and a case is reported in whom ileo-cystoplasty was used with satisfactory early result."

D'HAENENS, G. & SANTELE, A. Sur un cas humain de *Schistosoma rodhaini* trouvé aux environs d'Elisabethville. [**A Human Case of *Schistosoma rodhaini* Infection Found in the Elisabethville Neighbourhood, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1955, Oct. 31, v. 35, No. 5, 497, 1 pl.

SCHWETZ, J. Infection expérimentale des rats de maison (*Rattus rattus*) par divers schistosomes. [**Experimental Infection of *Rattus rattus* by Different Schistosomes**] (Deuxième note). *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 655-8.

The author's summary in French is freely translated as follows:

It has been shown in four recent experiments that *Rattus rattus* is as good a host as white mice for five African schistosomes, that is to say it is a good host for *S. mansoni*, *S. rodhaini*, *S. bovis* and *S. intercalatum* and an indifferent one for *S. haematobium*. But although it is a common animal and a possible substitute for white mice, *Rattus rattus* is difficult to handle. Although "domestic" (but not domesticated!) they are wilder and more vicious than the so-called wild rats of the field and jungle.

J. J. C. Buckley

SCHWETZ, J., BAUMANN, H. & FORT, M. Nouveaux essais de transmission de *Schistosoma mansoni* par *Pl. dufouri* (*Pl. metidjensis* du Portugal) et par *Pl. corneus* (de Bruxelles). [**Further Trials of the Transmission of *Schistosoma mansoni* by *Planorbis dufouri* (*Pl. metidjensis* of Portugal) and by *Pl. corneus***] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 5, 658-61.

The authors carried out experiments to compare the infectibility by *S. mansoni* of *Planorbis dufouri*, the transmitter of *S. haematobium* in Portugal, and *Planorbis corneus* which is closely related to *P. dufouri* both in its morphology and geographical distribution. Previously [this

Bulletin, 1956, v. 53, 72] they had shown experimentally that *P. dufouri* is capable of transmitting *S. mansoni*. Three strains of *S. mansoni* were used in the present experiments. One (a) was the same as that used in the experiment just referred to and the other (b) was a mixture of two strains obtained from London.

With miracidia from the first strain (a), 20 *P. dufouri*, 10 *P. [Austral-orbis]* *glabratus* and 10 *P. corneus* were exposed to infection and 10, 6 and 0 snails respectively became infected. The resulting cercariae were "passed" through mice, some of which became infected, and with the miracidia obtained, 15 *P. dufouri* and 15 *P. corneus* were exposed. Again none of the *P. corneus* became infected but 5 of the 15 *P. dufouri* became infected.

With the mixed strain (b), 20 *P. dufouri* and 20 *P. corneus* were exposed to miracidia and 4 and 0 snails respectively became infected. Mice were again infected and two more batches of snails were exposed, namely 15 *P. dufouri* and 10 *P. corneus*. Twelve of the *P. dufouri* became infected but the *P. corneus* all remained negative.

Speculating on this failure of *P. corneus* to become infected, the authors suggest that it may be due to the fact that this species had never had the opportunity to adapt itself to infection by schistosomes.

J. J. C. Buckley

CORRÊA, M. O. A. & AMATO NETO, V. Ineficácia do óxido estanhoso no tratamento da esquistossomíase mansônica. [**Failure of Stannous Oxide in the Treatment of *S. mansoni* Infections**] Reprinted from *Rev. Hosp. Clin.* S. Paulo. 1955, July-Aug., v. 10, No. 4, 298-300.

The English summary appended to the paper is as follows:—

"Six patients with mansonian schistosomiasis were treated with stannous oxide. Administration was made in 2 or 3 series of 8-day each, with a daily dose of 2.5 to 4 g. Fifty centigram tablets were employed. No therapeutic effect was noticed. Thus, the claims of Mauzé and Arnaud (1954) [this *Bulletin*, 1954, v. 51, 1174] who found 100% of clinical and parasitologic cures could not be confirmed."

FREYTAG, R. E., HUNTER, G. W. & RITCHIE, L. S. **Studies on Schistosomiasis. VII. Observations on some Surfactants for dispersing Insoluble Molluscicides.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1119-24.

With the exception of sodium pentachlorophenate nearly all the new effective molluscicides are insoluble. In appraising the efficacy of these a common difficulty is to convert them into forms which are readily applicable in field tests so that uniform coverage of the experimental area can be effected. In a previous paper [see this *Bulletin*, 1953, v. 50, 321] the authors described the use of various surface-active agents to dissolve

insoluble molluscicides, and the present study reports further investigation with 22 emulsifiers in order to determine which were best adapted for producing stable emulsions in water of 7 insoluble molluscicidal phenol derivatives.

With a standard technique, mixtures of molluscicide and surfactant were emulsified in water and were observed for up to 24 hours for separation and sedimentation. Attempts were also made to produce emulsible concentrates of molluscicides insoluble in surfactants by using other solvents to which emulsifiers were added. The molluscicides used were 2,4,6 trichlorophenol 90 per cent.; 2,4 dichlorophenol; 2-chloro-6-phenylphenol; 4 (and 6) chloro-o-phenylphenol 85 per cent.; copper pentachlorophenate and pentachlorophenate. The investigation showed, on the basis of the number of mixtures still stable after 24 hours, that the most suitable surface-active agents were alkyl aryl polyglycol ethers, polyethylene glycol 600 or 400, an alkyl aryl polyoxyethylene derivative and one of unknown composition. Some surfactants are known to have lethal properties and might increase the activity of molluscicides. Further, the mixing of soluble and insoluble molluscicides might provide a residual effect which would be valuable particularly in the case of operculated vectors, while concentrated emulsions might yield a more adhesive or resistant residue and increase molluscicidal efficiency.

[The detailed results of these interesting and possibly important investigations cannot be summarized and should be studied in the paper.]

T. H. Davey

DIAS, E. **Bacteriological Warfare on the Intermediate Hosts of Human Schistosomiasis.** *Mem. Inst. Oswaldo Cruz.* 1954, June, v. 52, No. 2, 320-27, 7 figs. [Portuguese version 315-20.]

This paper re-describes the discovery, isolation and field trials of the organism referred to here as BET (and in one previous paper as *Bacillus pinottii*) which is a natural parasite of aquatic snails and which, when present in sufficient numbers in the water, is lethal to them [see this *Bulletin*, 1953, v. 50, 825; 1954, v. 51, 284; 1955, v. 52, 797; 1956, v. 53, 213]. A number of small and large-scale trials in Brazil are reported in which the organism was used effectively in schistosomiasis control. Very large numbers of dead schistosome vectors and other snails were collected after cultures, preferably in peptone solution, had been added to the water, and it is stated that snails in untreated streams arising from treated ponds also died.

T. H. Davey

DECHANCÉ, Michèle & DESCHIENS, R. Action des sels de fer sur les mollusques vecteurs des bilharzioses. [**Action of Iron Salts on the Snail Vectors of Schistosomes**] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 4, 470-73.

KAGAN, I. G. & LEVINE, D. M. **Studies on the Serology of Schistosomiasis. II. The *in vitro* Activity of Cercariae of *Schistosoma mansoni* in Sera of Normal and Antigen-Injected Animals.** *Exper. Parasit.* New York. 1956, Jan., v. 5, No. 1, 48-58, 1 fig. [15 refs.]

The *in vitro* activity of normal sera from 17 different species of mammals and from one species of bird (a pigeon) was tested on one or more occasions (144 tests in all) against the living cercariae of *Schistosoma mansoni*. In addition 84 animals, representing 15 different species, were immunized with homogenized antigens prepared from the cercariae of *S. mansoni* and, after a suitable interval, their sera were similarly tested. For the most part, these antigens were injected intravenously twice weekly for three weeks; the total number of cercariae injected varying from 4,800 in the case of the dog, to 198,000 in the case of monkeys and sheep.

The authors' summary is as follows:—

“1. The *in vitro* activity of cercariae of *Schistosoma mansoni* was tested in the sera of the cat, cow, chicken, dog, goat, guinea pig, hamster, horse, man, monkey, mouse, pig, pigeon, rabbit, rat, sheep, squirrel, and steer. Except for human, squirrel and steer all species were injected with a homogenate of cercariae of *S. mansoni* and the sera tested for the presence of a pericercarial membrane (CHR of Vogel and Minning, 1949a).

“2. The stored normal serum of rat, guinea pig, chicken, dog, steer, pig, sheep, and goat was cercaricidal. The sera of all other species tested inactivated cercariae. The sera of cow and horse agglutinated cercariae. After heating normal sera at 56°C for 30 minutes the cercaricidal and inactivating properties of normal sera were lost and eight additional species agglutinated cercariae.

“3. Agglutination of cercariae was seen in all but rat sera during the course of injection of antigen. In some sera, the CHR prevented the agglutination of cercariae.

“4. The normal sera of all animals tested were negative for pericercarial membrane formation, (CHR of Vogel and Minning, 1949a). During the course of six intravenous injections of a cercariae antigen all species became positive for CHR. The appearance of the CHR after the start of antigen injections varied considerably from species to species.

“5. No correlation could be made between the *in vitro* response of serum of naturally resistant hosts, hosts with a high degree of resistance and susceptible hosts against cercariae of *S. mansoni* and the ability of these hosts to form antibodies after injection with a cercarial antigen. The sera of naturally resistant hosts and hosts with a high degree of resistance for *S. mansoni* were more cercaricidal than the sera of hosts susceptible to infection with *S. mansoni*.”

R. M. Gordon

Hsü, H. F., Hsü, S. Y. Li & RITCHIE, L. S. **Epidemiological Study on Schistosomiasis japonica in Formosa.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1042-8. [20 refs.]

Previous investigations concerning this infection in Formosa have dealt with the incidence of infection in *Oncomelania formosana* [reviewed this *Bulletin*, 1952, v. 49, 878] and in domestic animals [*ibid.*, 1955, v. 52, 663]. The present paper briefly notes the prevalence of infection in small wild rodents, ranging from 8.6 per cent. to 21.5 per cent., and reports the results of an investigation into the incidence of human cases.

Stool examinations were repeated 3 times on persons 5 years of age or more in 7 villages where opportunities existed for contact with water in snail-harbours ditches. An intradermal test with antigen prepared from adult *Schistosoma japonicum* was used on the inhabitants of 6 of these villages, and 3 additional stools were examined by sedimentation, acid-ether concentration and hatching, from each person showing a positive reaction. A total of 11,952 stools were examined from 3,984 persons in the villages studied and in addition 639 stools from 213 persons from other villages in the endemic area. In each of 3 persons one doubtful *S. japonicum* egg was found, all the rest yielding negative results. The eggs found may have been derived from ingested infected pig liver. The intradermal test was done on 2,562 persons in the endemic area and 142 persons from outside it. In the former series an average of 8.4 per cent. (range 5.6 to 15.6 per cent.) showed positive reactions and all those in the latter were negative. The 3 persons with doubtfully positive stools were negative. The re-examination of stools from positive reactors were again all negative.

In attempting to reconcile the differing results of the stool examination and intradermal test, it is suggested that *S. japonicum* in Formosa is a zoophilic strain for which man is an abnormal host and in whom, though the worms can live for a while, they do not produce eggs. Comparison of the result of intradermal tests in Formosa with those in China and Japan where anthropophilic strains of the worm are present reveals a much lower incidence of reactors in Formosa though the infection rates in snails were similar.

T. H. Davey

SADUN, E. H., CHAMNARNKIT, C. & CHETANASEN, S. **Studies on the Treatment of *Opisthorchis viverrini* in Human Infections with Quinacrine Hydrochloride and Chloroquine Phosphate.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1080-87, 1 fig. [10 refs.]

Opisthorchiasis, due to *Opisthorchis viverrini*, a species closely allied to *O. felinus*, is a major clinical and public health problem in Thailand.

Attempts are being made to find a therapeutic agent which would be helpful in the treatment of this infection. The only two readily available

were quinacrine [mepacrine] hydrochloride and chloroquine phosphate. Although nearly 150 persons infected with *O. viverrini* were selected over a period of 20 months, data at the end of treatment were available on only 65. All were Thai patients living in the north-eastern region. In the quinacrine series the number of eggs per gm. of formed faeces varied from 1,200 to 6,400 (average 4,070). Each patient was given 0.4 gm. quinacrine per day for 3 days, followed by a smaller dose for 2-5 days. No effect on the egg count was produced.

On the basis of preliminary results with chloroquine phosphate it was decided to increase the dosage and length of course of treatment. For this 23 males (19-47 years) were selected, with an average egg count of 7,570 eggs per gm. of faeces. Two were given 6.9 gm. of chloroquine base over a period of 20 days and the others 7.8 gm. over 23 days. As had been ascertained in previous series, 3-4 days after the start of treatment the egg count was higher than before. The stimulative effect of the drug on one patient was seen when the egg count rose from 30,800 to 72,400 per gm. At the end of treatment 10 patients were negative for *Opisthorchis* eggs, 11 had a lower count, and 2 a higher one than before treatment.

Thirteen patients were observed for 40-42 days after the administration of the drug had been discontinued. Of these 4 were still negative for *Opisthorchis* eggs, but 2 had an egg count even higher than at the beginning of treatment. The other 7 were still passing a few eggs with their stools. Two were followed for 90 days after discontinuation of treatment. One of them was still free from infection, the other had a lower egg count than at the end of treatment. It is concluded that the reduction in egg production is not just a temporary phenomenon.

Philip Manson-Bahr

PIETERS, G. La cysticerose chez le Congolais. [**Cysticercosis in Africans in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1955, Dec. 31, v. 35, No. 6, 751-5.

The author discusses the pathogenesis of cysticercosis and the various forms and modes of infection in man. He then records 7 cases seen in Africans in the Madimba region of the Belgian Congo. They took the form of small cysts, either intramuscular or subcutaneous. There was a remarkable absence of clinical manifestations.

H. J. O'D. Burke-Gaffney

TÖTTERMAN, G. & AHRENBORG, P. **The Age Distribution in Pernicious Tapeworm Anemia and Addisonian Pernicious Anemia.** *Acta Med. Scandinavica.* 1956, v. 153, No. 6, 421-6, 3 figs.

"Our investigation of the age distribution among patients with pernicious tapeworm anaemia shows greater resemblance to the age distribution in Addisonian pernicious anaemia than is shown by the

results of previous research workers. Some differences appear, however, for instance, a somewhat higher incidence of pernicious tapeworm anaemia in the younger age groups and a certain decrease in the very old age groups. The great similarity of the graphs is highly suggestive of the pathogenesis of the two forms of pernicious anaemia being similar in many respects. The same trends are observed in Japan where both Addisonian pernicious anaemia and pernicious tapeworm anaemia are extremely rare, in spite of the prolific occurrence of the broad tapeworm in some parts of the country (Amano, Kiyono and Amano).

“To sum up—we are inclined to consider the stomach as a factor largely determining the development of pernicious tapeworm anaemia in the same way as in Addisonian pernicious anaemia.”

TRAVERSA, E. & POLIZZI, F. L'idatidosi problema di sanità pubblica. [**Hydatid Disease as a Public Health Problem**] *Ann. d. San. Pubblica*. Rome. 1955, Sept.–Oct., v. 16, No. 5, 1081–1102, 3 figs. [35 refs.] English summary.

BONDUEL, A. A., PRIETO, M. M., MERONI, R. J. & GIUSSANI, A. A. Dos casos de fibrosis hepática en quistes hidatídicos que no comprimen las vías biliares. [**Two Cases of Hepatic Fibrosis in Hydatid Cysts which did not Compress the Biliary Tracts**] *Semana Méd.* 1956, Jan. 26, v. 108, No. 4, 131–3, 2 figs.

LO NIGRO, M. I primi casi di anchilostomiasi nella Provincia di Matera. [**First Cases of Ankylostomiasis in Matera Province, Italy**] *Giorn. di Malattie Infettive e Parassit.* Rome. 1956, Jan., v. 8, No. 1, 28.

RATHBONE, L. **Oxidative Metabolism in *Ascaris lumbricoides* from the Pig.** *Biochem. J.* 1955, Dec., v. 61, No. 4, 574–9, 1 fig. [29 refs.]

AMATO NETO, V. & CORRÊA, M. O. A. Tratamento da ascariíase pelo hidrato de piperazina. [**Treatment of Ascariasis with Piperazine Hydrate**] *Rev. Inst. Adolfo Lutz*. S. Paulo. 1955, v. 15, 230–34.

The English summary appended to the paper is as follows:—

“The authors treated 54 patients suffering from ascariasis with piperazine hydrate. The daily dose was 60 mgm. per kg. of body weight. Twenty two patients received the drug for five days, 28 other patients for seven days and the remaining four received two 7-day courses spaced by a 7-day interval. The percentage of cure for these three groups was 63·63%, 89·28% and 100%, respectively.

“The authors emphasize that the piperazine hydrate can be included among the most efficacious therapeutic agents for ascariasis, if it is not the best. They also emphasize some advantages of the drug as: (1) an almost complete lack of toxic or collateral manifestations; (2) no special precautions are needed in its administration; (3) may easily be administered to short-age [young] children; and (4) cheapness.”

ABDALLA, A. & SAIF, M. **On the Anthelmintic Efficacy of Piperazine Adipate.** *J. Egyptian Med. Ass.* 1955, v. 38, No. 8, 466-9.

The authors gave tablets containing 0.3 and 0.6 gm. of piperazine adipate to patients infected with *Enterobius vermicularis*, *Ascaris lumbricoides* and *Ancylostoma duodenale*. No purgative was given and no side effects were observed. The results were as follows.

Enterobius vermicularis. Of 7 patients given 0.6 gm. piperazine adipate 3 times daily for 7 days, 5 became negative. The other 2 claimed symptomatic relief and a reduction in the number of worms; one of them became negative after a second course of treatment. Of 6 patients given 0.6 gm. 3 times daily for 5 days, 3 became negative. Of the 3 others, repetition of the treatment cured one and the 2 others were cured by 4.5 gm. of piperazine adipate divided into 3 doses given all on one day.

Ascaris lumbricoides. Of 4 patients given 0.6 gm. 3 times daily for 7 days, all became negative. Of 9 patients given 0.6 gm. 3 times daily for 5 days, 7 became negative and one of the 2 others became negative after repetition of the treatment. Of 19 patients given 4.5 gm. divided into 3 equal doses all given on the same day, 11 became negative. Of the 8 others 7 had a second dose and 4 of these became negative. A third dose cured the remaining patients. Of 3 patients given 9 gm. in equal doses given on the same day all became negative. One patient who was not cured by 4.5 gm. was cured by 2 further doses of 9 gm.

Ancylostoma duodenale. Doses of 0.6 gm. 3 times daily for 5 or 7 days, or of 4.5 gm. or 9 gm. given on one day all failed to cure 30 patients.

Thus piperazine adipate is a satisfactory anthelmintic for the treatment of infections with *Enterobius vermicularis* and *Ascaris lumbricoides*, but it has no effect on *Ancylostoma duodenale*. G. Lapage

VAN DER KUYP, E. **Filariasis in Surinam.** *Arch. Inst. Pasteur de la Guyane Française et de l'Inini.* Publication No. 374. 1955, Sept., 5 pp.

In 1949 a Filariasis Control Section of the Bureau of Public Health was established in Surinam.

The author gives results of surveys undertaken between 1949 and 1951 and gives comparative findings published by earlier workers.

In Paramaribo, the capital, 50,861 (63·7 per cent.) of the inhabitants were examined and 8,857 (17·4 per cent.) were found to harbour microfilariae of *W. bancrofti*. There were 2,683 (5·3 per cent.) with elephantiasis.

Treatment with diethylcarbamazine in 3 different schedules was given to 7,113 persons with microfilariae and 80 per cent. were found to be free from microfilariae in the blood a year later.

The infection rate was lower in rural areas. Two other filarial worms, *D. perstans* and *M. ozzardi* were found almost exclusively in American Indians in the savannah region.

Reference is made to the results recorded by BRUYNING [this *Bulletin*, 1954, v. 51, 708] in his study of the vector *Culex fatigans*.

H. J. O'D. Burke-Gaffney

GALLIARD, H., BRYGOO, P. & GOLVAN, Y. Description de la microfilarie de *Wuchereria bancrofti* var. *vauceli* Galliard et Brygoo 1955. [Description of the Microfilaria of *Wuchereria bancrofti* var. *vauceli*] *Ann. Parasit. Humaine et Comparée*. 1955, v. 30, Nos. 5/6, 481-7, 3 figs.

The microfilaria of *Wuchereria bancrofti* var. *vauceli* Galliard and Brygoo, 1955 [this *Bulletin*, 1956, v. 53, 630] is described and the morphological and dimensional differences between it and the microfilariae of *W. bancrofti* and *W. malayi* are illustrated and set out in tables. The new variety differs from the microfilariae of *W. malayi* mainly in the absence of the two terminal nuclei which are characteristic of the latter and in having a shorter cephalic space. It also has a granular "inner body", which in *malayi* and *bancrofti* is usually more compact in form. It differs from the microfilaria of *W. bancrofti* in its smaller length (mean 0·25 mm.), in the larger excretory pore and cell, in the disposition and size of the "genital" cells which are larger than in *bancrofti*, and in the anal pore which is larger. The attitude of the new variety in a thick blood film lacks the graceful curves of *bancrofti*. In certain respects it is intermediate between *bancrofti* and *malayi*. The new variety was found in the blood of man on the west coast of Madagascar.

J. J. C. Buckley

DE FREITAS, J. F. T. & MAYALL, R. Fenómeno de Raynaud na mão esquerda, provocado por *Dirofilaria spectans*. [Raynaud's Phenomenon in the Left Hand by *Dirofilaria spectans*] Reprinted from *Rev. Brasileira Med.* Rio de Janeiro. 1953, July, v. 10, No. 7, 463-7, 3 figs. [28 refs.]

The English summary appended to the paper is as follows:—

"The first case 'Dirofilaria spectans' Freitas & Lent, 1949, as human parasite is described. Diagnosis of arterial obstruction was made by

means of arteriography and surgical retreat of the parasite. The Raynaud's phenomenon fully disappeared."

LAPEYSSONNIE, L. Note sur un foyer d'onchocercose cutanée découvert à l'occasion d'opérations de séro-dépistage des tréponématoses en A.O.F. [**Cutaneous Lesions of Onchocerciasis encountered during Serological Surveys for Treponematoses in French West Africa**] *Ann. Dermat. et Syph.* 1954, Nov.-Dec., v. 81, No. 6, 644-51, 3 figs.

In the course of routine blood examinations for spirochaetes performed on Africans a certain number of patients were found who had formerly been regarded as suffering from yaws and treated as such but in whom the serology was negative. This condition, called *so bana* by the local Africans, has a very close resemblance to cutaneous onchocerciasis. In one case microfilariae of *O. volvulus* were found in the lesions. The importance of these observations lies in the fact that the close resemblance to secondary and tertiary yaws may lead to a useless and dangerous course of treatment with bismuth and arsenic in cases of onchocerciasis. Serological examination is an essential part of the search for spirochaetal infections among African communities.

H. T. H. Wilson

NELSON, G. S. **A Preliminary Report on the Out-Patient Treatment of Onchocerciasis with Antrypol in the West Nile District of Uganda.** *East African Med. J.* 1955, Nov., v. 32, No. 11, 413-29, 2 figs. [69 refs.]

The author gives a useful account of the history of the recognition and treatment of onchocerciasis. Attention is drawn to the *adénolymphocèles* described in the Belgian Congo and associated with herniae in the West Nile District of Uganda. Almost the whole population of this district is infected with *O. volvulus*, with much misery from itching and disfigured skins, but only 1 per cent. of persons have lesions of the eye attributable to onchocerciasis. Utilizing the medical arrangements developed for the mass treatment of trypanosomiasis (a disease now having a much reduced incidence) the author set out to ascertain if therapeutic control of onchocerciasis could be obtained by weekly injections of Antrypol at dispensaries. The severity of the disease is not proportional to the concentration of microfilariae in the skin but smear counts of microfilariae were used in addition to a clinical assessment in recording the condition of the patient before, during and after treatment.

In this district the vector is *Simulium neavei*. Head nodules have not been found among 1,000 patients and in only one patient were there nodules around the knees; 90 per cent. of the detectable nodules are located around the pelvis over the femoral trochanters, the iliac crests,

the lower lumbar spine, the sacrum and coccyx. The average number of nodules per patient is low, in a group of 60 carefully examined the incidence averaged at 7 per patient. The dose of Antrypol used for adults was 0.5 gm. initially followed by 1 gm. at weekly intervals for 5 to 6 weeks.

Although nearly all the 56 patients treated experienced relief from skin irritation, and microfilaria counts were much reduced, the clinical results were disappointing: 15 patients showed some improvement, in 13 the disfigurement was worse, in 26 there was no clinical improvement and 2 died (apparently from unrelated causes). The 13 who became worse did so after severe reactions to Antrypol, usually after a total of 5 gm. had been administered.

The authors conclude that onchocerciasis should be treated with Antrypol only if the patient can be kept under close observation by a qualified medical practitioner and that mass treatment with Antrypol is not a practicable method of control.

[A well-conducted experiment and valuable article.]

Frederick J. Wright

EWING, G. M. & TILDEN, I. L. *Capillaria hepatica*. **Report of Fourth Case of True Human Infestation.** *J. Pediatrics*. St. Louis. 1956, Mar., v. 48, No. 3, 341-8, 6 figs.

"A fatal case of *Capillaria hepatica* infestation is described in a 15-month-old Caucasian child with death occurring a little less than four months after the onset of the illness. The diagnosis was made before death by means of liver biopsy which showed many parasites and their ova within the liver. This is the fourth instance of genuine human infestation to be reported and the second instance in which the diagnosis was made during life. The clinical symptoms and laboratory findings were similar to those seen in children with visceral larva migrans due to *Toxocara canis*, the dog roundworm. The presence of calcific fragments and foreign body giant cells in the lungs suggests pulmonary involvement by the parasites or their ova, and similar calcific fragments in the kidneys may have reached that location through the blood stream."

[See this *Bulletin*, 1955, v. 52, 1129.]

LOUGHLIN, E. & MULLIN, W. G. **The Treatment of Enterobiasis with Crystalline Oxytetracycline.** *Antibiotic Med.* New York. 1955, Mar., v. 1, No. 3, 145-50. [15 refs.]

Oxytetracycline was given daily for 7 days in doses varying according to the ages of patients as follows: those less than 5 years of age 1 gm. daily; those between 5 and 10 years 1½ gm. daily and over 10 years 2 gm. daily. Ova of *Enterobius vermicularis* failed to disappear in 4 of

92 patients treated, they reappeared in 3 patients within 42 days of treatment, and between 56 and 98 days after treatment in 7 patients. Examinations for ova were carried out after this period with negative results in 11 patients. Following treatment, anal pruritus was complained of by 22 patients, 10 of whom had also had pruritus as a symptom of the *E. vermicularis* infection.

It is argued that some of those who apparently relapsed may have been reinfected. [In the absence of data to substantiate this the only fair assessment is that they had relapsed. Unless oxytetracycline can be shown to be very much more effective than piperazine compounds for the treatment of enterobiasis it is doubtful if it is justifiable to expose patients to the risk of the proctitis and staphylococcal gastro-enteritis which may follow its use.]

[See also this *Bulletin*, 1952, v. 49, 712.]

A. W. Woodruff

HABERMANN, R. T. & WILLIAMS, F. P., Jr. **The Effect of Antibiotics, Phenothiazine, Sodium Fluoride, and the Combined Action of these Drugs, in the Removal of Oxyurids from Mice.** *Proc. Helminthological Soc. of Washington*. 1956, Jan., v. 23, No. 1, 36-9.

"1. Phenothiazine was the most effective of the anthelmintics tested for the removal of *Aspicularis tetraptera* and *Syphacia obvelata* from mice, expelling 74 per cent of the pinworms (uncorrected average efficiency).

"2. The antibiotics tested were less effective than phenothiazine in the removal of oxyurids from mice.

"3. Sodium fluoride alone and in combination with other antibiotics was not effective in the removal of oxyurids.

"4. Phenothiazine plus aureomycin, bacitracin, and terramycin respectively did not increase the anthelmintic efficacy of phenothiazine.

"5. Phenothiazine is more effective for the removal of *Aspicularis tetraptera* of the colon than for the removal of *Syphacia obvelata* from the cecum."

See also p. 781, ABDALLA & SAIF, **On the Anthelmintic Efficacy of Piperazine Adipate.**

NOTE

In the paper by CAVIER and GAULIN abstracted in this *Bulletin*, 1956, v. 53, 354, the substance used for treatment of enterobiasis is referred to throughout as dilaurate of diethyl-diamine; another (and more commonly recognized) name for this compound is piperazine dilaurate.

JEZIORAŃSKA, Alicja. Odczyny alergiczne w włośnicy u zwierząt doświadczalnych. [**Allergic Tests on Animals in Experimental Trichinosis**] *Med. Dośw. i Mikrob.* Warsaw. 1956, v. 8, No. 1, 89-102. [15 refs.]

The English summary appended to the paper is as follows:—

“28 white rabbits were infected with living larvae of *Trichinella spiralis* by means of a gastric tube. The animals were tested 3 to 229 days after infection. A total of 168 allergic tests was conducted with *Trichinella* antigens and 40 controls with *Ascaris* antigen, peptone solution and saline.

“27 white guinea pigs were infected with living *Trichinella* larvae and intradermal tests with *Trichinella* antigens and control solutions were made in the period between the 8th and 26th day following the infection.

“35 white rats were infected orally with meat containing a large number of *Trichinella* larvae. 206 intradermal tests with *Trichinella* antigens and 60 control tests were made in the period between the 9th and 101st days after infection.

“Three antigens were used in two concentrations: 1:5000 and 1:10,000. The best results were demonstrated with rabbits when antigen No. 3 had been used. There were about 66-76 per cent. of positive results in developed trichinosis cases. There were about 49-54 per cent. of positive results when antigen Nr. 2 had been used. The antigen No. 1 was inactive. The first positive results were demonstrated about 10 days after the infection.

“The guinea pigs gave poor allergic reactions and the white rats none at all.”

DEFICIENCY DISEASES

BOL. OFICINA SANITARIA PANAMERICANA. 1955, Nov., Suppl. 2, 1-259, numerous figs. [Numerous refs.] Publicaciones científicas del Instituto de Nutrición de Centro América y Panamá. [**Scientific Publications of the Institute of Nutrition of Central America and Panama**]

This is the second supplement. The first was published in 1953. It contains 29 papers written by the staff of the Institute.

Most have already been published in scientific journals: 12 appeared originally in English. This volume contains their Spanish translation only.

Seven of the 29 deal with clinical studies of nutrition. The titles

include: Dental findings in a nutritional study of schoolchildren in five Guatemalan Highland villages; Effect of aureomycin and penicillin on the growth of Guatemalan schoolchildren; The serum lipid levels of Central Americans compared with those of North American adults; Biochemical and haematological findings in kwashiorkor; and Nutritional studies in El Salvador and Panama.

The longest papers are on dietetic studies. There are 8; 2 deal with Panama, 1 with El Salvador, 1 with Costa Rica and 4 with Guatemala.

Five papers are on the subject of animal nutrition and include two on the effect of high environmental temperatures on the metabolism of rats and on that of chickens.

There are 3 papers on nutritive values: The carotene content of Guatemalan corn; Variation in the nitrogen tryptophane and niacin content of black beans; a high protein forage crop for tropical areas.

There is an article on the application of anthropology to public health programmes and a short statement about the distribution of blood groups in indigenous Guatemalans.

There are recommended dietetic scales for the people of Central America and Panama with the usual subdivisions for age, sex and activity. A table gives the composition of the different foods commonly eaten in Central America; another gives the botanical name of fruits and vegetables together with their local Spanish and English names.

Allen Daley

Ross, Mary A. **Nutrition and Home-Economics Programme in Egyptian Villages.** *Proc. Nutrition Soc.* 1956, v. 15, No. 1, 30-35.

Miss Ross is an American home economist, who was sent by FAO to work in an Egyptian village in a cooperative venture with the Egyptian Ministries of Health, Agriculture, Social Affairs and Education, and with WHO. Miss Ross appears to have fitted herself into rural life extremely quickly. Her report is lively and practical. As it is probably not yet generally realized what home economists can contribute to problems of rural health, the following extracts from her report are given.

"All my work has been done in association with Egyptian colleagues who have accompanied me on visits to villages and taken part in the surveys and demonstrations, as well as acting as interpreters. . . .

"During the 1st year of our work, all teaching was done in the homes. Neighbours would always gather to observe, listen and join in the conversation. We soon learned to limit our suggestions to simple changes that could be easily understood and accepted by the group and could be demonstrated on the spot with materials and equipment available to the family. The simple economy of the home, the 'barter' value of eggs and chickens, the scarcity of fuel and the difficulty of carrying water must all be considered and understood in developing an educational

programme. These are among the factors with which the home economist must learn to deal.

“Cooking facilities in the homes are simple in the extreme. They may consist of a three-brick stove, a clay brazier in which maize cobs are burned, the huge oven for bread that also serves as sleeping space in winter, or, occasionally, an old primus stove. Equipment includes one or more tinned copper pots, clay bowls and jugs of various sizes, a large reed basket for storing bread, a flour sifter, a brass mortar and pestle and a few tin cans with twisted-wire handles.

“The lack of any facilities for storing food or utensils, and the absence of established arrangements for meals, are constant sources of discouragement to the home economist. . . .

“Scarcity of fuel, lack of clean water in adequate amounts, absence of storage space protected from flies and dust, and the custom of preparing food on the mud floor all create problems of food contamination that are hard to solve. The incidence of intestinal infection is high. The difficulty of preparing foods that are safe for the weanling child is recognized and is reflected in the practice of nursing babies as long as possible, often into the 3rd year. Dehydration often occurs as the mother's milk supply fails, for the women fear to give the child any supplementary food or water. Rickets is common up to 2 years of age; it may be related to the practice of placing babies in the windowless room (oven), and covering them completely when they are outside.

“The heavy responsibilities of the woman and the arduous labour she performs make it desirable to simplify rather than complicate her daily life. Water must be carried, butter churned and cheese made every day. Maize is removed from the cob, taken to the mill, ground and sifted by hand, and bread baked every 7-10 days. This is an enormous task that requires three women to complete. . . .

“Alertness on the part of the home economists and the receptiveness of the people have led to the demonstration of several home improvements. These include an improved mud-brick stove which conserves fuel, eliminates smoke and the risk of fires, and gives the cook a working surface of comfortable height; porous clay jars with double walls and fitted covers which keep food cool by evaporation; palmstalk cupboards and shelves, a child's cot and other simple furniture which contribute to convenience and comfort in the homes. Because of the scarcity of soap and water, we are now trying to develop improved laundry methods.

“The home economists have selected a small group of teen-age girls in each village to act as their assistants and to receive special training, this being part of a plan to develop an extension service for women. In addition, nurses, midwives, female schoolteachers and other village workers in the Calioube Project receive practical training in nutrition and home economics. Young physicians about to enter service in government health centres are given simple instruction in applied nutrition.”

R. Passmore

GAUD, J. & RACOILLET, R. Enquête sur l'alimentation de dix familles de paysans marocains. [**Enquiry into the Diet of Ten Families of Moroccan Peasants**] *Bull. Inst. Hyg. Maroc.* 1954, v. 14, Nos. 3/4, 197-229.

This report describes a very thorough family diet survey. Ten peasant families, containing in all 103 persons, were each studied for 22 weeks throughout the four seasons of the year. The head man of the household gave out the grain from the store to the housewife once a week and she also went to market only once a week. Thus it was easy to weigh all food coming into the household. Small amounts of dairy products and fresh fruits were probably underestimated. The average calorie value of the food per adult man value per day was a maximum of 3,960 in summer and a minimum of 3,370 in autumn. This makes no allowance for wastage or for food consumed by the many domestic animals that are a feature of Moroccan homes. There was, however, no evidence of any insufficiency in the quantity of the food in any home.

The quality of the food was, however, in some respects far from satisfactory. Cereals supplied 67 per cent. of the calories and 78 per cent. of the protein. Animal protein consumed was less than 15 gm. per head per day. In the whole year in all 10 families only 45 different foods were eaten and only 10 articles of food (cereal, sugar, milk, butter, oil, potatoes, onions, carrots and small amounts of beef and mutton) were consumed regularly. This is the traditional diet of Moroccan peasants. To the French authors it appears very dull fare and they are "incited to optimism" that dietetic education will lead to more intensive agriculture, a better distribution of food and a much improved diet for the peasants.

R. Passmore

SMARTT, C. G. F. **A Note on the Value of Dried Milk as an Addition to the Normal African Diet in Institutions.** *East African Med. J.* 1956, Jan., v. 33, No. 1, 27-30.

In addition to the normal diet of a mental hospital, 20 African patients were given 4 oz. of dried milk in a pint of water with their evening meal for 4 weeks. During this period the 20 men gained 106½ lb. in weight (average gain, 5¼ lb.). A control group of 20 men eating the same food, but without the milk, gained 30¼ lb. (average, 1½ lb.). The basic diet was made up of maize meal and other elements and appeared adequate judged by African standards, and as most patients gain weight in the Institution, it is probably better than the food in their homes.

R. Passmore

THOMPSON, M. D. **The Serum Protein Pattern of African Infants in Uganda.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 77-81, 2 figs.

HOLMES, STANIER and THOMPSON [this *Bulletin*, 1956, v. 53, 230] have shown that the sera of adult Africans frequently have high values for

gamma globulin and low values for albumin. In new-born Africans the serum proteins do not differ significantly from American standards. This paper records the results of 120 estimations of serum protein in African children under 18 months. The fall in albumin and rise in gamma globulin appear to begin at the end of the first year of life and to be well established by 18 months. The possible effect of malarial infection on these changes is briefly discussed [*loc. cit.*]. [The use of the word "pattern" and the expression of values of both gamma globulin and albumin as percentages of total protein, as in this paper, appear to be misleading. They suggest that the rise in one and fall in the other are causally associated. There is no evidence for this.] *R. Passmore*

FRONTALI, G. **Malnutrition from Protein-Deficiency.** *Scienta Med. Italica*. 1955, Oct.-Dec., v. 4, No. 2, 273-305, 30 figs. [Numerous refs.]

This is yet another long account of protein deficiency. It has not been adequately put together. For instance of the 72 papers (18 of Italian origin) listed at the end, few receive any mention in the text, whereas many of the authors referred to in the text are not to be found among the references. Though some of the illustrations are excellent, others, *e.g.*, Nos. 11, 12, 14 and 15 are not only of poor quality, but describe conditions only casually associated with protein deficiency and so are not really relevant.

Professor Frontali does not like the word kwashiorkor, which he says "appears to bear no precise meaning". Here he is in error. However, he does well to draw attention to Czerny's account of *Mehlnährschaden* and to point out that this disease described in Germany in 1906 corresponds to the "starchy food dystrophy" in Italy and thus appears to differ in no essential way from kwashiorkor in Africa. [Writers of textbooks of paediatrics in English for the most part overlooked completely the early continental literature on the disease and are only slowly taking cognizance of the more recent tropical literature. For this reason reviews such as this may be useful, but it is unfortunate that this one has not been more accurately set down.] *R. Passmore*

THOMPSON, M. D. **Sources of Protein for the Prevention and Treatment of Kwashiorkor.** *East African Med. J.* 1955, Dec., v. 32, No. 12, 451-8.

DEAN, R. F. A. **Undernutrition in East Africa: a Description of the Group for Research in Infantile Malnutrition of the Medical Research Council, Mulago Hospital, Kampala, Uganda.** *Pediatrics*. Springfield, Ill. 1956, Jan., v. 17, No. 1, 121-37, 1 fig.

VOUILLOUX, P. Dénutrition infantile et hormone somatotrope. [**Infantile Undernutrition and Growth Hormone**] *Méd. Trop.* Marseilles. 1955, July-Aug., v. 15, No. 4, 456-61. [11 refs.]

The author describes 36 cases of kwashiorkor seen at Fort Lamy near Lake Chad. The disease there resembles descriptions from other parts of Africa, but 3 special features are present. There is a marked seasonal incidence in the hot dry months from March to June. The majority of the children are dehydrated and not oedematous. The heat balance is very unstable. These probably result from the severe climatic stress.

In addition to orthodox treatment, 16 children received 300 Evans units of growth hormone in either 3 or 6 injections. Of these 12 improved markedly and 4 died. Of 17 control children, 9 were improved, 6 died and 2 became worse. [These results would not satisfy a statistician, but the author, who is clearly a good clinical observer, was convinced that some of the children reacted favourably to the hormone. Further trials appear to be merited.]

R. Passmore

PATWARDHAN, V. N. **Protein Element in Indian Nutrition.** *Indian J. Med. Sci.* 1956, Jan., v. 10, No. 1, 1-18, 9 figs. [31 refs.]

This is the text of a lecture given by the author during a tour of China, as a member of an Indian Medical Delegation to the People's Republic of China. A useful review is given of the present state of our knowledge of protein requirements. The "biological value" of a protein, as determined by standard laboratory techniques, does not always correlate well with the content of essential amino-acids. It is suggested that the biological value may be limited, not by the maximum deficiency of a single essential amino-acid, but by the combined effects of partial deficiencies.

Studies of endogenous protein metabolism in Indians are reviewed. The endogenous output of nitrogen is usually between 41 and 46 mgm./kgm. of body weight per day. This is in line with American and European studies and there is no evidence of any racial distinctions.

An account is given of the principal features of kwashiorkor, as seen in India, and its public health importance.

R. Passmore

GOPALAN, C. & RAMALINGASWAMI, V. **Kwashiorkor in India.** *Indian J. Med. Res.* 1955, Oct., v. 43, No. 4, 751-73, 5 figs. on 2 pls. [63 refs.]

This is a valuable review of the subject. It is interesting that, of the 63 references, 34 come from Indian journals. There can be no doubt of the importance of this disease in India. Most of the papers reviewed

have already been abstracted in this *Bulletin* and the experienced reader will probably not find much new. However, kwashiorkor has not yet received sufficient recognition and standard textbooks of medicine, paediatrics and public health for the most part contain quite inadequate accounts. This review can be strongly recommended to all Indian undergraduates and postgraduate students.

R. Passmore

SAID, M. **Kwashiorkor in Negri Sembilan.** *Med. J. Malaya.* 1955, Sept., v. 10, No. 1, 20-47, 19 figs. [29 refs.]

This paper gives a detailed clinical picture of 9 children suffering from kwashiorkor. The descriptions are admirable and leave no room for doubt that the disease is essentially the same as in Africa. In Malaya xerophthalmia and keratomalacia are commonly found associated with kwashiorkor, though this is rare in Africa. However, as in Africa, the disease arises in "deprived children" and some of the case reports illustrate vividly how either parental death or negligence lead to its onset.

R. Passmore

MIROWSKI, D. K. & TADZER, I. S. Notre expérience du traitement de la pellagre par l'hormone hypophysaire corticotrope (A. C. T. H.). [Our Experience in the Treatment of Pellagra with the Pituitary Hormone Corticotrophin] *Ann. Dermat. et Syph.* 1954, May-June, v. 81, No. 3, 259-70, 2 figs. [29 refs.]

The authors point out that some of the clinical features of pellagra—the weakness, the pigmentation, the anorexia, the cachexia, the osteoporosis and the sudden death without apparent cause—resemble those in Addison's disease. Further, they demonstrated an apparent adrenal insufficiency in laboratory tests. In 5 patients there was a diminished eosinopenia after the Thorn test, a hypersensitivity to insulin and a diminished hyperglycaemia after adrenaline. These 5 patients were treated with corticotrophin (400-500 mgm. as daily injections of 25 mgm.) and kept on their usual diet apart from control of water and salt intake. In all the cases corticotrophin therapy alone had a good effect on the skin lesions, the gastro-intestinal and neuro-psychiatric manifestations.

R. Passmore

KNÜTTGEN, H. Über ein Ataxiesyndrom bei liberianischen Eingeborenen (Strachan-Scott-Syndrom). [An Ataxia Syndrome in Liberians (Strachan-Scott Syndrome)] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Dec., v. 6, No. 4, 472-91. [23 refs.]

This paper deals with the verification of the entity now known as the oculo-oro-genital syndrome of JACOBS [this *Bulletin*, 1952, v. 49, 533].

It is quite clear on referring to history that this is the syndrome first described by STRACHAN in Jamaica in 1897 and confirmed later with a great wealth of detail by H. H. SCOTT (1918) also in Jamaica [see this *Bulletin*, 1919, v. 13, 372] in his classical description based upon pathologo-anatomical material. Further search through the literature brings us to the polyavitaminosis with ataxia and polyneuritis discussed by SPILLANE [*Bull. Hyg.*, 1947, v. 22, 730] and DENNY-BROWN (*Medicine*, 1947, v. 26, 41). At the end of 1950 at a meeting of the Liberian Medical Association a series of 11 extremely severe and characteristic cases of a neurological syndrome were exhibited. It was noted at that time that the illness started two months after the onset of the rainy season. Among the ambulant patients of the clinic many other incipient forms of the same syndrome were observed. At this stage the author re-studied Scott's original work more closely and found that his observations on the nutrition of the sugar cane workers were so exact that they fitted into the Liberian picture. This, as originally painted, is not to be confused, so the author says, by being referred to by RANSOME (*Brit. Med. J.*, 1944, Nov. 11, 637) as the syndrome of Hawes, Pallister and Landor. This claim should not be recognized and this well-marked neuropathy should henceforth be known as the Strachan-Scott syndrome. It is not identical with the prison disease of LANDOR and PALLISTER in Malaya [*Bull. Hyg.*, 1935, v. 10, 733], or the ataxic paraplegia of PALLISTER [this *Bulletin*, 1940, v. 37, 801]. DANARAJ [*ibid.*, 1950, v. 47, 394] speaks about nutritional spinal ataxia and its relation to pellagra, but Scott differentiated his disease as a "central neuritis".

The staple food in Liberia is rice; cassava plays a minor role. The fat mostly is provided by palm oil. It is therefore a carbohydrate diet, deficient in protein and lacking in vitamin B2 factors. In spite of this chronic protein-deficient diet the nutrition of the people generally is good. As far as can be ascertained beriberi and pellagra are of little significance. Only uncivilized adult aborigines are affected. The season of scarcity occurs during the rainy season, with a shortage of rice.

The neurological symptoms are usually preceded by a florid, rudimentary or fully developed "oculo-oro-genital syndrome". At first there are fissures at the canthi of the eyes, with blepharoconjunctivitis and episcleral infection and occasionally vascularization of the cornea with attendant phenomena such as eyelid sensitivity. In the mouth there are rhagades and fissures, which are overlaid by a yellow crust or exudate. They are painful and itch, and during healing this angular stomatitis becomes depigmented. The early stages are popularly known as "sore corners", the later stages as "white corners". The lips show cheilosis, with epithelial desquamation, which causes an intense burning sensation. Glossitis is quite uncommon.

The changes in the scrotum commence with intense pruritus which results in fine brawny desquamation, which gives it a shining silvery

appearance. After this fissures appear, resulting in ulcers and even in necrosis of the skin.

The neurological manifestations of the syndrome develop in the course of, or as a sequel to, the oculo-oro-genital syndrome and can begin without the preliminary cutaneous symptoms. The nerve changes first affect the legs, then the arms, then the trunk and finally the mouth and face. The general description has been compiled from a 4-year period of observations on well over 100 cases.

The symptoms are summarized as follows:

Stage I: Paraesthesia and numbness in the legs and especially in the feet, often with muscular pain and spasms and sensations in the skin (these are quite distinct from those of "burning feet" in which the pains are in the soles of the feet). Backache is also common. In the hands there is weakness and numbness. Both superficial and deep tendon reflexes are weaker than normal. Tests show interference with sensation and occasional hyperaesthesia. Pressure on the calf muscles is painful. The knee-elbow and Romberg tests are uncertain as is also steppage on the flat. There is slight ataxia on turning or bending. Complicated coordination of the hands becomes confused (*adiadokokinesia*).

Stage II: There is marked ataxia in walking on a "broad base", with drunken staggering gait. Standing with closed feet with open eyes becomes impossible. Bending is also very difficult as is rising from squatting position. Position test in distal joints and especially in the feet is defective and the patient is unsteady in the finger-nose test. *Adiadokokinesia* is more pronounced with intensive tremor and dysmetria, moderate hypoaesthesia, diminution of muscular power.

Stage III: The patients cannot stand upright without support and are unable to rise from a sitting position. The tongue becomes clumsy and enunciation impaired. The sense of taste is destroyed. The deep reflexes are abolished, though sometimes the biceps and triceps jerks escape. The superficial reflexes (abdominal and cremasteric) may also be absent, although there are no signs of pyramidal involvement, no ocular manifestations or nystagmus. Hypoaesthesia becomes more intense: there are no pains on movement, but there is a feeling of numbness all over the body and especially on the face.

Eventually there ensues a severe degree of incoordination and asynergy in the extremities, so much so that the hand cannot be passed to the mouth. The movements of the hands themselves are athetotic without control. There is a marked ataxia of the trunk so that the patients fall out of bed in attempts to raise themselves. In spite of these nerve changes there is no atrophy or contracture. The march of the neuropathy is symmetrical from the beginning. As originally described by Scott there are no characteristic fundus changes. At the most there is some bleaching of the temporal portion. Treatment with BAL (dimercaptopropanol) was unsatisfactory.

Course and Prognosis. Cases are apt to have remissions which may

take months to supervene, and the amount of improvement is in direct ratio to the severity of the initial symptoms. There were no deaths in this series.

Aetiology. The subject is discussed at length and the various "infection" theories are analysed. The author concludes, as did Scott, Pallister and Danaraj, that the patients are subjects of a dietetic deficiency due to a one-sided diet rich in carbohydrate.

Details are given of 11 cases.

Philip Manson-Bahr

JANSEN, B. C. P. **Early Nutritional Researches on Beriberi leading to the Discovery of Vitamin B₁.** *Nutrition Abstracts & Reviews.* 1956, Jan., v. 26, No. 1, 1-14. [Numerous refs.]

FLOCH, H. & GÉLARD, A. M. "La cerise ronde de Cayenne". *Malpighia punicifolia* L. Sa richesse exceptionnelle en vitamine C. [Unusual Richness in Vitamin C of the "Round Cherry of Cayenne", *Malpighia punicifolia*] *Arch. Inst. Pasteur de la Guyane Française et de l'Inini.* Publication No. 368. 1955, July, 6 pp. [14 refs.]

SPRUE

GARDNER, F. H. & ROMERO, C. **A Preliminary Study of Small Bowel Mucoproteins in Tropical Sprue.** *Amer. J. Med. Sci.* 1956, Jan., v. 231, No. 1, 82-5, 1 fig.

Samples of gastric and jejunal juices were examined in 15 controls and 7 patients with untreated sprue (weight loss, diarrhoea, impaired absorption of sugar and fats, and macrocytic anaemia), 6 with treated sprue and 11 with sprue syndrome (intestinal malabsorption but no macrocytic anaemia). No significant differences between the controls and patients were found so far as mucoproteose and mucoprotein content of gastric juices was concerned. There was, however, a notable difference in content of dissolved mucoprotein in the jejunal juice in the normal volunteers and in sprue patients, the latter being significantly low.

B. G. Maegraith

HAEMATOLOGY

WALKER, A. R. P., FLETCHER, D. C., REYNOLDS, P. A., BERSOHN, I. & SONNENFELD, E. D. **Reduction to Normal Levels of the High Erythrocyte Sedimentation Rates in Apparently Healthy South African Bantu Men.** [Correspondence.] *Nature*. 1956, Mar. 10, v. 177, 480-81.

Unusually high erythrocyte sedimentation rates [ESR] are common in healthy persons in the tropics. Although malnutrition is not believed to influence the rate directly, the authors from the South African Institute for Medical Research, Johannesburg, have found that the high rates commonly seen in apparently healthy Bantu mine-workers fall to normal limits after 4 to 15 months during which they have consumed the excellent diets provided in the mine compounds. These mine-workers come from areas where the diet is low in animal protein, fat, certain minerals salts and vitamins. The mine compound diet is nutritionally adequate.

A table shows the results of estimation of the ESR by Wintrobe's method in 4 groups of African mine-workers, each group consisting of 15 to 75 subjects. There was an equal degree of abnormality of the ESR in recruits with and without previous service in the mines: this suggests that the normal values found when the men left the mines rose again when they returned to tribal life.

The dramatic change in the rates after a period in the mine compounds was not due to medical treatment, so that the consumption of the mine compound diet for several months seems to have been responsible.

The significance of these observations has yet to be established, but the authors point to the possible value of including ESR determination in nutritional studies of non-white subjects. *H. J. O'D. Burke-Gaffney*

VORA, D. D. **A Clinical Study of Augmentation of Haemopoietic Effect of Intravenous Iron by Cobalt.** *Indian J. Med. Sci.* 1956, Jan., v. 10, No. 1, 19-32, 2 figs. [21 refs.]

"Iron saccharated oxide was given intravenously to a group of sixteen patients who were studied in detail and whose results were compared to those obtained with another similar group of sixteen patients who were treated with iron saccharated oxide with cobalt. Both groups were similar initially. The results of the iron-cobalt group were encouraging compared to those obtained by giving iron alone."

DAS GUPTA, C. R., CHATTERJEA, J. B. & RAY, R. N. **Role of Citrovorum Factor in Nutritional Macrocytic Anaemia.** *J. Indian Med. Ass.* 1956, Feb. 1, v. 26, No. 3, 85-91. [18 refs.]

"Seven cases of NMA were treated with leucovorin. Initial haemopoietic response was very good in five cases, very fair in one case and

nil in one case. Well sustained response was seen in only two cases; in others blood levels either steadied at a subnormal level or else started to fall off. Leucovorin does not appear to supply completely the missing factors in an average case of NMA. Liver extract and high protein diet possibly contain accessory factors which greatly potentiate the haemopoietic activities of purified haemopoietic factors like vitamin B₁₂, folic acid and leucovorin."

See also p. 779, TÖTTERMAN & AHRENBORG, **The Age Distribution in Pernicious Tapeworm Anemia and Addisonian Pernicious Anemia.**

PRANKERD, T. A. J. **Electrophoretic Properties of Myoglobin and its Character in Sickle-Cell Diseases and Paroxysmal Myoglobinuria.** *Brit. J. Haematol.* Oxford. 1956, Jan., v. 2, No. 1, 80-83, 3 figs.

"The electrophoretic mobilities of myoglobins from a normal adult and patients with sickle-cell disease and paroxysmal paralytic myoglobinuria are described.

"Normal myoglobin has an isoelectric point of 6.0 compared with 6.85 for haemoglobin. No difference in the electrophoretic mobilities of the three myoglobins was found.

"It is concluded that myoglobin is derived by different syntheses from haemoglobin and that the genetic defect of sickle-cell disease is confined to haemopoiesis."

SHELL, N. B. & MCGINLEY, J. M. **Sickle-Cell-Hemoglobin-C Disease. Report of a Case with Electrophoretic Studies of Hemoglobin in Family Members.** *Amer. J. Dis. Children.* 1956, Jan., v. 91, No. 1, 38-44, 3 figs. [23 refs.]

"A case of sickle-cell-hemoglobin-C disease in a 9-year-old girl is presented with paper electrophoretic studies of the family members.

"Sickle-cell-hemoglobin-C syndrome is not a rarity and clinically may simulate classical sickle-cell disease. However, it is milder and carries a better prognosis. Sickling tendency with increased numbers of target cells, progressive splenomegaly, and minimal signs of hemolytic anemia are characteristic. Paper electrophoresis offers a practical and definitive method of diagnosis.

"The clinical, hematologic, and genetic aspects of this inherited abnormality are reviewed and discussed."

TOXOPLASMOSIS

MEYER, H. & MENDONÇA, I. de A. **Electron Microscopic Observations of *Toxoplasma* 'Nicolle et Manceaux' grown in Tissue Cultures. (First Note.)** *Parasitology*. 1955, Nov., v. 45, Nos. 3/4, 449-51, 6 figs. on pl.

For the study of the structure of *Toxoplasma* by electron microscopy, the authors used cultures of the parasite in chick embryonic tissues. These were transferred to coverslips coated with Formvar, on which they were grown by Maximow's method for 24-48 hours, after which they were fixed in osmic vapour and washed in water. Finally, the material was placed on electron microscope grids and shadowed with chromium.

Since the parasite is too thick for penetration of the electron beam, its inner structure was not revealed in the above preparations. However, the authors claim to have seen "a very delicate, transparent mantle" covering the body, but no "sheath" determining its shape. The appearance of *Toxoplasma* as seen by electron microscopy is illustrated by a plate of photomicrographs. [These illustrations demonstrate clearly the inadequacy of electron microscopy for the study of protozoal morphology, which is more clearly revealed by light microscopy in properly stained preparations. See also BRINGMANN and HOLZ, this *Bulletin*, 1954, v. 51, 217.]

C. A. Hoare

UNITED STATES PUBLIC HEALTH SERVICE PUBLICATION No. 141. **Toxoplasmosis. Pathology of Neonatal Disease. Pathogenesis, Diagnosis, and Treatment** [FRENKEL, J. K. & FRIEDLANDER, S.]. pp. iv + 108, 1 chart & 91 figs. on 28 pls. [184 refs.] 1951. Washington 25: U.S. Govt. Printing Office. [50 cents.]

Although this very comprehensive monograph is dated 1951, it has only recently been received in the Bureau: but because of its full and informative nature and because it has been prepared by two well-known authorities, a note is included now so that it may be recorded for future reference.

Much has been written on toxoplasmosis since this report was prepared and with that readers of this *Bulletin* will be familiar: but although the present work has no references later than 1951, it is a very complete account and discussion of the knowledge then prevailing.

Five fatal and 2 non-fatal cases of neonatal toxoplasmosis are fully described. There is then a discussion of transmission, histopathology and clinical features with a review of the pathogenesis and serological aspects. A section is devoted to laboratory diagnosis, and this is followed by observations on differential diagnosis and treatment. Finally, the lacunae in our knowledge which require further investigation are summarized.

An outstanding feature of the publication is the review and discussion

of the literature, which covers, even in 1951, no less than 184 references. At the end of the monograph, there are 28 plates of 91 excellent illustrations, most of them photomicrographs. *H. J. O'D. Burke-Gaffney*

LEITRITZ, E. Beobachtungen an dem Krankheitsbild der chronischen toxoplasmotischen Encephalomyelitis. [**Observations of the Clinical Picture of the Encephalomyelitis of Chronic Toxoplasmosis**] *Med. Klin.* 1956, Mar. 2, v. 51, No. 9, 340-41, 2 figs.

This is a short paper in which there is first a reference to the results of the surveys by a number of workers in Germany who found that serological tests indicated that a high proportion of the population have been infected with toxoplasmosis. During the last 10 years the author saw 168 cases of suspected toxoplasmosis in Swabia and of these 130 gave positive test results. In this experience a number of patients had signs and symptoms of encephalomyelitis, the clinical picture of which is not as yet sufficiently well known. The symptoms which are regarded as being characteristic of this form of chronic toxoplasmosis are headache, particularly in the morning, pains in the spinal musculature which begin in the lumbar region, spreading upwards to the neck, and paraesthesia of hands and feet with numbness and a feeling of weakness. There is next a very long list of other symptoms and signs of chronic toxoplasmosis. Reference is made to a particular form of the chronic disease which consists in an osteochondrosis of the small joints of the extremities. Some problems which arise as the result of widespread toxoplasmosis infection are mentioned, *e.g.*, the testing of blood donors, toxoplasmosis as a possible industrial disease, life insurance in relation to the infection and the testing of individuals before marriage. *M. E. Delafield*

MOHR, W., WAHLE, H. & STAMMLER, A. Experimentelle Toxoplasma-infektion beim Rhesusaffen. [**Experimental Toxoplasma Infection in Rhesus Monkeys**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Dec., v. 6, No. 4, 386-430, 22 figs. [Numerous refs.]

Eight rhesus monkeys were infected with toxoplasms obtained from the peritoneal exudate of mice. One received approximately 300 million organisms by mouth and 7 were given injections by the intravenous, subcutaneous and intraperitoneal routes of 30-40 million parasites. Two different clinical pictures were seen. On the one hand, after a 10-day interval a pyrexial illness with epileptic fits occurred, accompanied by a rise in the cell and protein content of the cerebrospinal fluid; this lasted for some 2 weeks and then the animals recovered. In the majority of animals, on the other hand, fever and anorexia developed within 3 days and death followed wasting, weakness and apathy by the 13th day. Among the pathological effects caused by the infection were pneumonia,

lymph-node enlargement, diarrhoea, myocardial infiltration, cerebral signs and leucopenia. Among many other observations it is noted that in spite of the short duration of the illness the complement-fixation test had become positive in 4 monkeys. A parasitaemia was demonstrated, and from post-mortem material toxoplasms were recovered from heart blood, brain, lung, liver, spleen and cerebrospinal fluid. I. A. B. Cathie

DERMATOLOGY AND FUNGUS DISEASES

AREÁN, V. M. & FOX, I. **Dermal Alterations in Severe Reaction to the Bite of the Sandfly, *Culicoides furens*.** *Amer. J. Clin. Path.* 1955, Dec., v. 25, No. 12, 1359-66, 6 figs. [19 refs.]

Shortly after his arrival in San Juan, Puerto Rico, a 36-year-old man was exposed to the bites of flies believed to be *Culicoides furens*. Twelve hours later he noticed bullous lesions associated with itching and burning at the site of the bites. In 5-10 minutes pale indurated weals developed measuring 3-4 mm. in diameter, some showing pseudopods, and each surrounded by a red halo measuring 1 cm. in diameter. Within 2 hours the lesions were reduced to small palpable nodules, 10 hours later a small vesicle was visible at the site of the punctum, and within 24 hours the vesicles reached a size of 5 mm. When 10 *Culicoides* were ground with sterile glycerol and applied to the forearm a red pruritic oedematous patch appeared in 24 hours and a papule which lasted 3 days. A control patch with glycerol alone was negative. Histological examination of a 4-hour-old lesion showed degenerative changes in the collagen fibres associated with interstitial oedema and swelling of the vascular endothelium as well as disrupted eosinophils. A 24-hour lesion showed a vesicle beneath the horny layer with hydropic degeneration of the basal layer and degeneration of the basement membrane. The dermis showed oedema with dense infiltration with eosinophils, lymphocytes and monocytes. Degeneration of the collagen fibres occurred with eosinophils arranged along the fibres. The capillaries were dilated with swelling of the endothelium and minute perivascular haemorrhages.

A 48-hour lesion showed a large bulla in the epidermis beneath the horny layer and bulla formation in the corium with abundant serous fluid rich in eosinophils. The vessels were dilated and there was marked infiltration of the perivascular areas with lymphocytes, eosinophils, monocytes and histiocytes.

An 18-day-old lesion showed acanthosis of the epithelium and hyalinization of the connective tissue with a small epidermal inclusion cyst in the dermis.

There appear to be two types of reaction to insect bites: (1) the immediate wealing type which occurs in persons previously exposed to the attack of the insect; (2) the delayed reaction which may be the result of a "slow-acting poison" the nature of which has not been determined, but which has some toxic action upon the blood vessels and collagen fibres. The presence of a "spreading factor" may explain the effect on blood vessels far from the site of the bite. *H. T. H. Wilson*

- ANGULO, J. J. & MARTINS DE CASTRO, A. F. Rapport entre le taux de résorption d'une solution saline injectée dans le derme et certaines phases cliniques du pemphigus foliacé. [**Association between the Rate of Absorption of Saline Injected Intradermally and Clinical Stages of Pemphigus Foliaceus**] *Ann. Dermat. et Syph.* 1954, July-Aug., v. 81, No. 4, 400-403. [19 refs.]

Normal saline was injected intracutaneously into the forearms of 153 patients suffering from pemphigus foliaceus and studied at São Paulo, Brazil. The time of absorption of the papule so formed was measured and it was found that there was a clear relationship between the absorption time and the stage of the pemphigus. Of those in a chronic phase of the disease 79.3 per cent. gave an average absorption time of less than 30 minutes while only 38.7 per cent. of those undergoing a partial remission showed an absorption rate of 30 minutes or less; other stages of the disease were not studied. There was no significant difference in the absorption times of the two sexes. *H. T. H. Wilson*

- ANGULO, J. J. & FERRAZ-MAZZONI, L. E. Sur la fonction hypophyso-adréno-corticale dans le pemphigus foliacé. [**Pituitary-Adrenocortical Function in Pemphigus Foliaceus**] *Ann. Dermat. et Syph.* 1954, July-Aug., v. 81, No. 4, 404-8. [18 refs.]

In 17 cases of chronic pemphigus foliaceus and 11 cases in partial remission the eosinopenia following an injection of adrenaline demonstrated the importance played by the pituitary and the adrenal cortex in this condition.

This fact is consistent with the distinct rise in circulating eosinophils in fasting patients suffering from this disease. There is no evidence to show whether allergy or parasitic infection is responsible for the eosinophilia. Clinical findings and the results of laboratory tests also support the theory that a pituitary-adreno-cortical mechanism plays an important part in this condition. There was no obvious change in the level of the urinary urea and creatine following an injection of adrenaline in 11 chronic cases and in 7 cases in partial remission. *H. T. H. Wilson*

ABBOTT, P. **Mycetoma in the Sudan.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 11-24, 2 maps & 9 figs. on 4 pls. [31 refs.] Discussion 24-30 [DUNCAN, J. T.; RIDDELL, R. W.; WOODRUFF, A. W.; AINSWORTH, G. C.; MANSON-BAHR, P.; WADDY, B. B.; ABBOTT, P. (in reply)].

This important report reveals a surprisingly high incidence of mycetoma in the Sudan, as indicated by the diagnosis of 1,231 cases at the hospitals during 2½ years. The area of high endemicity of the infection lies roughly between the parallels of 18°N. and 12°S. latitude, and there is no doubt that this area of the disease extends both eastward and westward in the same climatic belt, into the neighbouring countries. The geographical limits of this great endemic area are determined by climatic factors—a wet season lasting for 5 months of the year, which favours the growth of the fungi in the soil, followed by dry and hot seasons which encourage sporing and aid the dispersal of the spores. The character of the soil, the types of vegetation, including the species of thorny shrubs, and the habits and customs of the people, are not peculiar to the endemic region and therefore have no evident bearing on epidemiology.

In his careful study of 213 mycetomata on 207 patients, the author has made important new observations and corrected some misunderstandings of the disease. In this series of cases, male patients predominated in the proportion of 5 to 1, and the disease was found in all age-groups but particularly between adolescence and middle life. Three mycological types of the infection were recognized, due respectively to *Madurella mycetomi* (143), *Nocardia somaliensis* (65) and *Nocardia pelletieri* (5). The source of infection is the soil, and trauma by thorns plays an important part in the inoculation; however, no particular species of thorn bush has been incriminated in this respect.

Contrary to a widely held belief, the isolation of *M. mycetomi* in culture from the lesion presents no difficulty. A study of isolates of *M. mycetomi* growing on soil extract agar, showed a conidial form of reproduction, reported for the first time in this species. The generic diagnosis of *Madurella* has been emended accordingly and the species *Glenospora khartoumensis*, Chalmers and Archibald, has been transferred to the synonymy of *Madurella mycetomi*.

The black-grain mycetoma, caused by *M. mycetomi*, tends to remain localized and encapsulated until a late stage of development. It spreads along the tissue planes and, despite its ramifications, it can be eradicated surgically, at an early stage, without seriously damaging the surrounding structures. Two unusual sites of the presumed primary lesion of the disease were the medulla of the tibia or the ulna in 4 patients, and the periosteum in 3 patients. Such cases, indicating a haematogenous infection, are of particular interest.

The prognosis in incurable mycetoma depends to a large extent on the

effect of the disease on the patient's capacity to earn his living. In such cases, death is more frequently due to starvation than to chronic toxæmia. A patient with independent means may live for an indefinitely long time though suffering from destructive and extensive disease.

In chemotherapy, oxytetracycline and carbomycin gave encouraging results in cases of infection by *N. somaliensis*, but *M. mycetomi* was not affected by antibiotics. Tests *in vitro* with diamidinodiphenylamine (M & B 938) on *M. mycetomi* showed a fungistatic effect, most marked at pH 7.0. Therapeutic tests were not satisfactory, but the drug merits further trial.

[Readers interested in mycetoma are recommended to consult this valuable paper in the original.]

J. T. Duncan

MACKINNON, J. E. & ARTAGAVEYTIA-ALLENDE, R. C. **The Main Species of Pathogenic Aerobic Actinomycetes causing Mycetomas.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1956, Jan., v. 50, No. 1, 31-40, 8 figs. on 2 pls. [Numerous refs.]

The authors studied 38 strains of the following species of aerobic actinomycetes isolated from mycetoma: *Streptomyces maduræ* (8), *S. pelletieri* (3), *S. somaliensis* (7), *Nocardia brasiliensis* (18) and *N. asteroides* (4). The characters particularly studied and set out in the brief report on each species are: the macroscopic and microscopic morphology of the micro-organism in culture; its principal biological properties, including the capacity to utilize certain test substances in the culture medium as sources of essential carbon or nitrogen; the morphology of the fungus in the parasitic "grain", which is usually distinctive and, finally, tests of pathogenicity for mice. These descriptions will be found very helpful in the identification of new isolates.

A new observation was the development of terminal chains of spores on the aerial filaments of one of the strains of *Nocardia somaliensis*, which warrants the transfer of this species to *Streptomyces*. The 2 semi-acid fast species *N. brasiliensis* and *N. asteroides* are distinguished from each other chiefly on the proteolytic power of the former and on its capacity to utilize galactose as the source of carbon, both of which are wanting in *N. asteroides*.

Following each description is a discussion on the history, taxonomy and geographical distribution of the species.

J. T. Duncan

VAN STAVEREN, C. Een geval van coccidioidomycosis. [**A Case of Coccidioidomycosis**] *Nederl. Tijdschr. v. Geneesk.* 1956, Mar. 10, v. 100 (i), No. 10, 706-8.

The English summary appended to the paper is as follows:—

"Report on a case of coccidioidomycosis, a disease which had not been seen in the Netherlands before. Some clinical aspects are discussed with

reference to the literature on this disease, which is quite common in the southern states of the U.S.A."

EGEBERG, R. O. & ELY, A. F. *Coccidioides immitis* in the Soil of the Southern San Joaquin Valley. *Amer. J. Med. Sci.* 1956, Feb., v. 231, No. 2, 151-4.

Coccidioides immitis was isolated in direct culture from 35 (7 per cent.) of 500 samples of soil collected between Buttonwillow and McKittrick, in the southern part of the San Joaquin Valley, California. Suspensions of the soil sample, in water, equivalent to 1 in 10, 1 in 100 and 1 in 500, were plated directly in 0.5 ml. volumes on plates of "Sabouraud's fortified medium", the composition of which is not stated. After 10 days' incubation at room temperature apparent colonies of *C. immitis* were picked off, subcultured and finally inoculated into mice to obtain conclusive proof of their identity.

Samples were taken from the walls of animal burrows and also from random points not less than 5 feet from a burrow. Of 177 samples from burrows, 24 (13.6 per cent.) gave positive results, and the remaining 323 samples, from random points, yielded 11 positive results (3.4 per cent.).

Of the total 500 samples, 380 were collected at the end of the dry season (mid-January) and 16 of these (4.2 per cent.) gave positive results. The remaining 120 samples were collected at the end of the wet season (mid-April) and 19 of these (16.0 per cent.) yielded the fungus.

The random samples were taken at 4 levels; at the surface and at depths of 4, 8 and 12 inches below the surface of the soil. Out of 243 random samples taken in January, positive results were obtained from 6 and there was no significant difference in relation to the depth of sampling, but from 80 samples taken in April the only 5 positive results (from 20 samples) were all from surface samples.

There is evidently some association of the growth of the fungus with the environmental conditions in animal burrows, and also with the humidity of the soil. The seasonal difference in the distribution of the fungus in depth in the soil is difficult to understand. J. T. Duncan

BAKER, O. & BRAUDE, A. I. A Study of Stimuli leading to the Production of Spherules in Coccidioidomycosis. *J. Lab. & Clin. Med.* 1956, Feb., v. 47, No. 2, 169-81, 11 figs.

Serial observations on the growth of *Coccidioides immitis* in the liquid medium of Dubos, showed that apical hyphal growth was impeded and arrested when a solid body, such as another hypha or a mass of little glass beads, lay across the direction of growth. A somewhat similar effect was obtained when a suspension, in Ringer-lactose solution, of washed, living, neutrophil leucocytes from human blood was mixed with

a suspension of mycelial elements. The phagocytes became attached to and surrounded the living spores and hyphal articles and, although unable to destroy the fungal cells, arrested their growth. When a suspension of dead leucocytes was used no such effect was produced. By the addition of normal human plasma to the mixture of living leucocytes and fungal elements, a further effect was produced, for not only was the growth in the filamentous form arrested by the leucocytes, but the stunted mycelial articles were converted, in part, into swollen, thick-walled cells containing refractile bodies. These cells, in the authors' opinion, correspond to the parasitic spherule or sporangial form of the fungus, but the stages in the development of the endospores are not mentioned. When human plasma from a patient with coccidioidomycosis, containing specific antibodies, was used instead of normal plasma, the development of the spherules was accelerated.

Experiments *in vivo* with 2 groups of mice, one of which was irradiated by X-rays to provoke a state of leucopenia, showed that *in vivo* also the neutrophil leucocytes played an important part in the conversion of the mycelial inoculum into the parasitic spherules, for this appeared to occur much more readily in the normal mice than in those in a state of artificially induced leucopenia. Thus, the neutrophil leucocytes "not only fail to destroy the fungus but they also encourage the formation of the destructive spherule".

J. T. Duncan

FRIEDMAN, Lorraine, SMITH, C. E. & GORDON, L. E. **The Assay of Virulence of *Coccidioides* in White Mice.** *J. Infect. Dis.* 1955, Nov.-Dec., v. 97, No. 3, 311-16, 4 figs. [Refs. in footnotes.]

To measure and compare the virulence of strains of *Coccidioides immitis* for mice, an optimal dose of 100 viable (infective) particles from a culture of the fungus was injected into the peritoneum. During the following 90 days daily records of the cumulative percentage of the animals found dead were plotted on a chart against the time, so that the mortality curve gave an indication both of the death rate and the survival time and showed the proportion of early deaths. As an example of its application, 3 strains of *C. immitis* were compared by this method. Other uses were to estimate the optimal dose for inoculation, which, in the most virulent of the 3 strains, was shown to be 100 viable particles, to compare the lethal susceptibility of mice in relation to their age and sex, and to compare different strains of mice.

The method of recording described above was shown to be superior to those in which the observations were based on (a) the number of days, after inoculation, in which a mortality rate of 50 per cent. (LT 50) was reached; (b) the percentage of deaths up to the end of a fixed period of 30 days, and (c) the dose of the inoculum (number of viable particles) needed to kill 50 per cent. of the animals in 30 days.

J. T. Duncan

BIEBERDORF, F. W. & CHAMBLISS, K. W. **A Positive Control for Coccidioidin Complement Fixation.** *Pub. Health Rep. Wash.* 1955, Aug., v. 70, No. 8, 771-4.

To provide a control positive serum for use with the diagnostic complement-fixation test for coccidioidomycosis, the authors infected young female rabbits of 5 to 7 lb. weight by intraperitoneal inoculation with living spores of 4 strains of *Coccidioides immitis*. Fourteen days after inoculation the serum of many of the animals was found to possess a high titre of antibody capable of fixing complement in the presence of coccidioidin antigen. This serum, when lyophilized, could be stored in sealed capsules at room temperature for an indefinite time without significant diminution of its specific antibody titre.

The authors point to the value of a preserved control serum of this kind, for use in laboratories where fresh, positive coccidioidomycosis human serum is not readily available, and the number of diagnostic complement-fixation tests for coccidioidomycosis called for annually is few. They admit, however, that further investigation is needed to determine whether or not the specific antibody in the rabbit serum and that in human serum react with the same antigenic elements (polysaccharide or protein) in the coccidioidin antigen. *J. T. Duncan*

CHERNISS, E. I. & WAISBREN, B. A. **North American Blastomycosis: a Clinical Study of 40 Cases.** *Ann. Intern. Med.* 1956, Jan., v. 44, No. 1, 105-23. [39 refs.]

The authors have studied the case records of 40 patients with North American blastomycosis who were treated in the Milwaukee County General Hospital during the 44-year period from 1910 to 1954. Analysis of the reports yielded the following epidemiological data: age of patients—from 15 to 71 years, the average being 41 years; sex—males 34 and females 6; race—white people 33, Negroes 6, North American Indian 1. There was nothing significant in the occupational history of the patients except that more than one-half were engaged at outdoor work. There was no evident seasonal incidence of the disease and no indication of the probable source of infection. The mode of infection was presumed to be by inhalation.

In 36 of the patients the disease was of the systemic type involving various organs and tissues, and in 4 it was of the milder cutaneous type. The tissues principally involved were the skin (30), lungs (28), subcutaneous tissues (25), bones and joints (19), lymph nodes (5), male reproductive organs (11), central nervous system or its coverings (4), gastro-intestinal tract (7), and other organs less frequently. It is noteworthy that of the 36 patients with systemic disease, 10 had no skin lesion and 7 no demonstrable pulmonary lesion. In 8 cases of the

systemic disease there was a history of an acute pulmonary infection preceding the development of recognizable signs of blastomycosis.

The diagnosis should be based on the demonstration of *Blastomyces dermatitidis* in morbid material, by microscopy or by culture, but repeated tests may be necessary as either of these methods may fail for a time even in the presence of active disease.

In treatment, intensive administration of iodides was employed in 36 cases, but when used alone this form of therapy gave disappointing results except in a single case of the cutaneous form of the disease. When combined with surgical measures, X-ray therapy and desensitization with specific vaccine, iodides were effective in curing 7 out of 19 patients. Other drugs and antibiotics were ineffective. Three of the more recent cases were treated with stilbamidine; one with apparent cure after 4 courses amounting to a total of 5.65 gm. of the drug. Relapse with dissemination of the disease had occurred after the first course of 1.05 gm. The other 2 patients, after temporary clinical improvement, died from the disease. They had received, respectively, 2.7 gm. and 9.40 gm. of the drug.

In the matter of prognosis, all patients in this series who survived 4 years from the onset of the disease were alive and well 10 years after the time of onset.

J. T. Duncan

MISCELLANEOUS DISEASES

CASPER, J. & SHULMAN, J. **Bilateral Cortical Necrosis of the Kidneys in an Infant with Favism.** *Amer. J. Clin. Path.* 1956, Jan., v. 26, No. 1, 42-7, 5 figs.

"Bilateral cortical necrosis of the kidneys occurred in an infant as a result of favism transmitted through breast feeding. We explain this anatomic pathologic condition by the supposition that a 'Trueta shunt' occurred in our patient. We do not know if a toxin of favism or the extensive hemolysis induced the 'Trueta shunt.'"

"We regard the occurrence of bilateral renal cortical necrosis of man as an individual variation of the intrarenal anatomic vascular relationship demonstrated in the rabbit by Trueta and his associates."

COUTINHO, A. **Tropical Eosinophilia: Clinical, Therapeutic and Etiologic Considerations. Experimental Work.** *Ann. Intern. Med.* 1956, Jan., v. 44, No. 1, 88-104, 1 fig. [115 refs.]

"The principal geographic, clinical, therapeutic and etiologic aspects of tropical eosinophilia have been reviewed. It is the opinion of the

author that, although tropical eosinophilia belongs to the large group of pulmonary-eosinophilic syndromes, it should be separated from the other miscellaneous and confusing disease entities. The author has described his experimental work with human volunteers in an attempt to transmit the disease, and has reviewed the animal experimentation carried out by other workers, principally that conducted by Sen and Tribedi, who have recently succeeded in provoking a high and sustained eosinophilia with pulmonary alterations in guinea pigs."

BARNES, H. D. **Porphyria in the Bantu Races on the Witwatersrand.**
South African Med. J. 1955, Aug. 20, v. 29, No. 34, 781-4, 5 figs.
[19 refs.]

The high incidence of porphyria in the Union of South Africa is well recognized. Most cases seen in non-Europeans show the characteristics of delayed cutaneous porphyria and the acute form is rare among the urbanized community of South African Bantu in the industrial area round Johannesburg.

Systematic spectroscopic examination of any specimen of urine which appeared dark revealed the presence of porphyrins in 300 non-European subjects. The records of 113 of these were reviewed. Females numbered 82 and males 31 and the condition was usually noticed first at adolescence with a rise in incidence up to middle life. Only 8 subjects had no skin disorder and about one-third attended hospital for advice regarding skin lesions. Pellagra was diagnosed on 25 occasions and it was considered essential to exclude porphyria in the differential diagnosis of this condition. Other complaints were pain in the abdomen or extremities and conditions unrelated to porphyria. About half the patients admitted to taking alcohol, but not all of these could be regarded as heavy drinkers. The most common skin lesion was a bulla varying in size from 1 mm. to several centimetres, situated on an area exposed to sunshine. When the blister broke healing was slow and a scar might form. Generalized hyperpigmentation of face and hands was marked as was hypertrichosis, often limited to the temporal and preauricular regions. Serological tests for syphilis were performed on 66 patients, 38 of which were positive and 28 negative. It may be very difficult to distinguish the ulcer seen in porphyria from a syphilitic one. Liver disease is widespread among Bantu races and in 69 patients in the present series the liver was palpable to some degree in 37 and impalpable in 32.

H. T. H. Wilson

DAVIES, J. N. P. **Siderosis in African Livers. A Geographical Note.**
East African Med. J. 1956, Jan., v. 33, No. 1, 25-6.

The author refers to the heavy deposits of iron found in the livers of Africans in Johannesburg [this *Bulletin*, 1954, v. 51, 224, 300] and the suggestion that this condition is probably due to iron overload

in the diet, and that it differs in pattern from that of idiopathic haemochromatosis.

The author, with TROWELL, had noted that there appeared to be no accounts of this condition in tropical Africa, other than the report of heavy deposits of iron in the livers of Africans in the Gold Coast published by EDINGTON [*ibid.*, 1954, v. 51, 1095]. The condition had not been seen in autopsy material at Mulago Hospital in Uganda where patients are seen who come from many parts of East and Central Africa. As the geographical boundaries of this iron deposition have not been worked out, the author had resort to the examination of viscerotomy specimens from the Virus Research Institute at Entebbe, as a possible method of delimiting the condition.

In 91 specimens (50 from Uganda, 28 Kenya, 10 Tanganyika and 1 each, N. Rhodesia, Nyasaland and Seychelles) no frank haemosiderosis was found: only 3 showed any considerable excess of iron and in none of them was there any appreciable cirrhosis. One each came from Uganda, Tanganyika and Kenya. In no case were large amounts of iron seen and the iron present was confined to the Kupffer cells, with a few pigment granules in the liver cells.

The author observes that the material studied, while it throws no light on the position of the boundary between East and South Africa where heavy iron deposits begin to occur, does suggest that it is below southern Tanganyika. It should thus be sought for in the Rhodesias and Nyasaland, if, in fact, it exists beyond the environs of Johannesburg. The possibility that the condition is due to local environmental conditions in South Africa is stated.

H. J. O'D. Burke-Gaffney

BACKHOUSE, T. C. **Malignant Tumours in Melanesians.** *Med. J. Australia.* 1955, Dec. 24, v. 2, No. 26, 1061-3. [10 refs.]

During a period of 18 years, from 1923 to 1940, the author examined material from 83 malignant tumours in full-blooded Melanesians, 21 of which were from autopsies and 62 from biopsies. Of the 21 autopsy specimens, 15 were classed as carcinoma and 6 as sarcoma. The biopsy specimens provided a similar proportion of carcinomata, chiefly from the leg following chronic ulcer, and from the mouth. The proportion of male to female patients examined post mortem was 10 to 1 and the majority of the former were aged 20-30 years.

There were 28 squamous carcinomata, 9 from the buccal cavity and 10 from the extremities, some of the former possibly related to betel chewing and the latter supervening on chronic tropical ulcer of the leg. Two cases of squamous carcinoma of the conjunctiva are described. There were 17 cases of glandular carcinoma, including 6 of primary carcinoma of the liver, one occurring in a boy aged only 14 years.

Advanced cirrhosis of the liver, apart from malignant disease, was encountered 6 times in 1,050 autopsies of Melanesians. There were 2 cases of carcinoma of the stomach and one each of gall-bladder, colon, bronchus, uterus and breast. There was also a miscellaneous group of 10, which included 2 cases of glioma of retina, and there was a group of 25 sarcomata, 7 of which were lymphosarcoma and one haemangiosarcoma in an infant, all recorded without comment. *W. L. Harnett*

PARASITOLOGY : GENERAL

SWELLENGREBEL, N. H. **Wild, Domestic and Interhuman Parasitism.**
Documenta Med. Geograph. et Trop. Amsterdam. 1955, June,
v. 7, No. 2, 182-91. [17 refs.]

The author discusses the mode of origin of certain zoonoses, using the word in a restricted sense, limiting it to parasitic and bacterial infections common to man and mammals, where man suffers from the disease, but is not an essential host. The original condition is always wild, *i.e.* the parasite is in a wild animal and man only becomes involved by accident; it next becomes domestic, *i.e.* animals in the house are infected; finally there are inter-human stages. Sometimes, however, the process goes into reverse and the infection in a domestic host reverts to a wild one—this is called a feral parasitism, and examples are given, including the transfer of *Pasteurella pestis* from rats in South African ports to the striped mice and gerbils of the Karroo, or from rat plague in San Francisco to selvatic plague in the wild rodents of the interior. Yellow fever in South American monkeys (derived from *Aedes aegypti* infections from Africa) and *Echinococcus granulosus* in the wolf and moose in Canada (probably escaped from a human community) are other examples of feral parasitism.

The author emphasizes once again the importance of relative insusceptibility in the maintenance of an infection in the wild host. [See also BALTAZARD *et al.*, this *Bulletin*, 1954, v. 51, 174; HEISCH, *ibid.*, 264.]

In the final stages, such as human flea-borne plague in Morocco, urban yellow fever, *T. gambiense* sleeping sickness, *S. mansoni* schistosomiasis, etc., the zoonotic aspect becomes increasingly veiled. Other infective agents appear to evolve into subspecies during their parasitic course, and it is difficult to know whether they should really be placed in the same category as the foregoing: a good example is relapsing fever. The organism is originally *Borrelia* [*Spirochaeta*] *hispanica* or *dipodilli*, and

will occasionally infect man; it progresses *via O. moubata* transmission to *B. duttoni* and finally *via* lice to the inter-human parasite *B. recurrentis*. A similar species change is shown by the *Rickettsia* series (*R. orientalis* to *R. mooseri* and finally to *R. prowazeki*), though here the first can hardly be considered as a direct ancestor. P. C. C. Garnham

HOARE, C. A. **Intraspecific Biological Groups in Pathogenic Protozoa.**

Reprinted from *Refuah Veterinarith*. 1955, June, v. 12, No. 2, 263-58. [25 refs.]

The nomenclature of certain parasitic micro-organisms is unsatisfactory at present, because the older taxonomic terms do not take into account the biological differences which clearly separate one group from another. Such differences are based on antigenic structure, but are not always constant, for instance, trypanosomes can adapt themselves to different antibodies produced in succession by the host and a series of "relapse strains", immunologically distinct, follows. Such strains contain both group and race antigens. Other biological races on the other hand have proved remarkably stable for at least half a century.

The classification of biological races is still unsettled, but the author suggests here (as he has already done elsewhere) a method which has the merit of simplicity. It is an attempt to classify groups which though morphologically identical, are distinct on physiological or ecological grounds. Segregation induces the production of species; a similar genetical mechanism is responsible for biological divergencies. The rank to be accorded to each group will vary according to the general nature of the organism, in the same way as the differentiation of species depends on individual judgment, and not all groups will be of equivalent status. If there is no intergrading, then the organism remains as a "species", *c.g.* *Entamoeba histolytica* and *E. ranarum*, *Leishmania donovani* and *L. tropica*, *Trypanosoma evansi* and *T. equiperdum*. If there is intergrading, the organism is regarded as a subspecies, thus: *Trypanosoma brucei brucei* and *T. brucei gambiense*, *Theileria parva parva*, *T. parva mutans*, *T. parva dispar*. If the groups show only minor serological, clinical or hostal variations, they are then to be ranked lower than subspecies, and the term "deme" is employed, preceded by the appropriate differentiating feature, thus: *Leishmania donovani* with 3 "nosodemes" referring to the Indian, Mediterranean and Sudanese forms, *Plasmodium falciparum* and *vivax* with a number of "serodemes" according to place of origin (and immunological difference), *Trypanosoma evansi* with camel, horse and cattle "xenodemes". Some of the demes have mixed characteristics. [*P. falciparum* in this classification might present itself as a "noso-sero-xenodeme".] Finally, unstable relapse strains are called "morphae". P. C. C. Garnham

HOEPPLI, R. **Imaginary Parasites and their Role in Medicine.** *Proc. Alumni Ass., Malaya.* 1955, Dec., v. 8, No. 4, 287-300. [42 refs.]

Imaginary parasites have played an important part in medicine from ancient times up to comparatively recently. In this paper Dr. Hoeppli writes fully and engagingly about these hypothetical creatures.

It is pointed out that even the introduction of scientific diagnosis by the increasing use in the 17th century of Leeuwenhoek's microscope strengthened belief in imaginary parasites as microscopists got the impression that everything was full of microscopic organisms, and so it came about that leucocytes, red blood corpuscles and other cells were readily mistaken for agents of disease.

The author, in this most learned discourse, has unearthed the belief in miraculous parasites among primitive peoples since the earliest times in Egypt, Mesopotamia, India, China, Arabia, Malaya and Europe. One of the worst offenders in this respect was Ambroise Paré in the 16th century, who not only believed that many strange animals might be created in abscesses, but he also described and figured numerous others which had allegedly passed out from the intestinal tract. Paracelsus and his followers assumed the existence of many "small worms", invisible to the naked eye, which were held responsible for many diseases. The belief in imaginary "ear worms" was widespread, goes back to ancient times and was mentioned by Galen. The belief in a "toothworm", causing dental caries, was evidently more widespread than belief in any other imaginary parasite. It possibly started in the Nile Valley between 4,000 and 900 BC, and spread *via* Indo-China and Indonesia to the Pacific Isles and so to the Western shores of America.

The innumerable descriptions of highly fantastic larger parasites found in the medical literature of different countries merely show the fertile imagination which has existed.

Philip Manson-Bahr

ALICATA, J. E. & DAJANI, S. W. **A Brief Survey of Intestinal Parasites of Man in the Hashemite Kingdom of Jordan.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1037-41.

This paper records the results of examinations for intestinal parasites of stool specimens from 425 persons in Palestine, 125 being from Jerusalem and 300 from Amman. The common parasites were *Entamoeba histolytica*, the incidence being 12.0 per cent. in Jerusalem and 20.3 per cent. in Amman, *Ascaris lumbricoides* 77.6 per cent. and 51.3 per cent., and *Trichuris trichiura* 78 per cent. and 44.3 per cent., respectively. The difference in *E. histolytica* incidence in the two areas may have no significance because they were investigated at different times and another survey in Jerusalem has shown a marked seasonal fluctuation in prevalence. Hookworm infection was not seen. Economic and sanitary standards in the area were low, owing to the large influx

of refugees, and in view of this the incidence of intestinal parasitism is regarded as comparatively light. T. H. Davey

PUBLIC HEALTH REP. Wash. 1955, Oct., v. 70, No. 10, 957-82.

Parasitism in Southeastern United States. A Symposium [YOUNG, M. D.]. 957. **History of Human Parasitic Infections** [FAUST, E. C.]. 958-65. [38 refs.] **Current Status of Parasitic Diseases** [WRIGHT, W. H.]. 966-75. [28 refs.] **Veterinary Parasite Problems** [BAILEY, W. S.]. 976-82. [18 refs.]

The history and epidemiology of parasitic disease in the United States of America are outlined in the introduction and the first paper. In addition to the indigenous infections of the American Indians, exotic parasites were introduced into the favourable environment of the south-eastern region 3 centuries ago by the European colonists and by their slaves. These were spread widely by migration. Some of these infections failed to establish themselves while others flourished epidemically or endemically. During the period 1900 to 1950 knowledge was accumulated concerning the aetiology and natural history of parasitic disease and public health programmes were initiated, as a result of which these infections no longer constitute an important public health problem.

The reduction in incidence of parasitic disease, discussed in the second paper, cannot be associated with any spectacular medical advance, apart from that of malaria following the use of DDT, and is to be attributed to a general improvement in living standards. Recent information regarding the incidence of parasitism in the south-eastern States is summarized and it is concluded that remarkable declines in the incidence and intensity of certain parasitic diseases have occurred. Ascariasis, trichuriasis, and ankylostomiasis, have all shown a decreased incidence over the past 20 years. Amoebiasis incidence does not appear to have dropped but morbidity has. Trichinosis incidence has changed little but few clinical cases are reported. Toxoplasmosis infection as revealed by dye-test surveys is comparatively common and may be of public health importance. Malaria has virtually been eliminated so that in 1954 only 8 proved cases and 1 suspected were reported throughout the United States. Attention is drawn to the recent recognition of visceral larva migrans attributed by several authorities to infection with dog or cat ascarids. Creeping eruption due to larval *Ancylostoma braziliense* appears to be relatively common, more than 8,000 cases having been seen in Florida during a 6-month period. Although the general picture is satisfactory complacency would be inadvisable; certain parasites can transport other disease agents and even light infections may have implications of which we are not yet aware.

Parasitism in domestic animals, discussed in the final paper, is more serious in the south-eastern region than elsewhere in the United States,

but it is difficult to present a clear picture of the problem, in part because knowledge of the parasites is incomplete or lacking. A brief survey is given of parasitic infections in the different animals, which cannot be summarized and should be read by those interested. The author concludes by emphasizing the need for more information as to the distribution and incidence and the biology and host-parasite relationships of the parasites.

T. H. Davey

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

CLASTRIER, J. Nouvelles stations de culicides arboricoles en Algérie. [New Findings of Arboreal Mosquitoes in Algeria] *Arch. Inst. Pasteur d'Algérie*. 1955, Sept., v. 33, No. 3, 273-8.

SOUTH PACIFIC COMMISSION. Noumea, New Caledonia. **Distribution of Mosquitoes in the South Pacific Region** [IYENGAR, M. O. T.]. *Technical Paper No. 86*. 1955, mimeographed pp. v + 47, 1 folding map. [31 refs.] [In English & French.] [8s.; 75 frs. CFP.]

This valuable up-to-date compilation of published data on mosquitoes of the South Pacific Region recognizes 278 species and subspecies for the region; there are doubtful records for 4 other species. Five of the accepted species are widely distributed in and beyond the region; 44 species are mainly Oriental or Malayan in distribution; 33 species are Australian and 196 species are almost wholly confined to the South Pacific Region. The map shows the limits of a *northern*, *western*, and an *eastern subregion* and of an *intermediate zone* between the last two subregions.

Part I of the paper summarizes the distribution of mosquitoes in the numerous islands forming the subregions, discusses special points for species of interest, and names the vectors of filariasis and of malaria. The accepted idea that the mosquito fauna originally spread eastwards from the west is re-affirmed. Anophelines, as is well known, do not occur east of the New Hebrides (in the intermediate zone) and the numbers of species and subspecies of mosquitoes in the western and eastern subregions are, respectively, 234 and 13; there are 41 in the intermediate zone. Part II provides a systematic list of all species, naming the islands on which they occur; this information is also set out more conveniently for the non-systematist by listing all the species occurring on each island.

D. S. Bertram

COLLESS, D. H. **Environmental Factors affecting Hairiness in Mosquito Larvae.** [Correspondence.] *Naturc.* 1956, Feb. 4, v. 177, 229-30, 1 fig.

Hairiness in the larvae of *Aedes scutellaris* has been shown to be conditioned by some environmental factor common in, but not restricted to, tree holes [this *Bulletin*, 1954, v. 51, 1305]. The author has found a similar situation relating to *Aedes albopictus* in Singapore.

Rearing experiments were conducted to discover the factors responsible. Lengthening the growth period and the presence of the micro-flora and micro-fauna of tree-hole water do not appear to play any direct part, but the factors appear to reside in some non-living particle. However, tests made so far have not caused any hairiness in the larvae of *Aedes albopictus* and the investigation continues. H. S. Leeson

HADDOW, A. J. **Observations on the Biting-Habits of African Mosquitos in the Genus *Eretmapodites* Theobald.** *Bull. Entom. Res.* 1956, Jan., v. 46, Pt. 4, 761-72, 4 figs. [19 refs.]

"The biting-habits of mosquitos in the genus *Eretmapodites* Theobald, as shown by 24-hour catches, display a certain uniformity in that all the species studied are essentially diurnal and bite very close to the ground, in shade. They do not enter dwellings.

"When, however, two localities are compared (the Entebbe area and Bwamba County) it is found that there is a fundamental difference in behaviour. At Entebbe there is an exceedingly well-marked wave of activity before sunset. This does not occur in Bwamba, where the cycle shows no pronounced characteristics apart from its generally diurnal nature. It is shown that this difference arises from the fact that in Bwamba the first hour of biting-activity tends to be the most intense (no matter when it occurs) whereas in Entebbe the hour before sunset is almost always preferred.

"One group (the *E. chrysogaster* group) is present in both localities. In Entebbe it shows an activity curve of the one type, and in Bwamba a curve of the other type.

"It is concluded that some environmental influence must be involved. At the moment, however, no suggestion can be made concerning the nature of this influence, beyond the fact that the activity-patterns concerned are not easily explained in terms of microclimate." [See also this *Bulletin*, 1946, v. 43, 255, 863.]

LEVÍ-CASTILLO, R. Nueva división sistemática del género *Haemagogus* Williston 1896 y una nueva especie ecuatoriana: *Haemagogus garciai*, n. sp. [New Systematic Division of the Genus *Haemagogus* and a New Species, *H. garciai*, in Ecuador] *Rev. Ecuatoriana de Entom. y Parasit.* Guayaquil. 1954-1955, v. 2, Nos. 3/4, 359-64, 5 figs. English summary.

See also p. 800, AREÁN & FOX, **Dermal Alterations in Severe Reaction to the Bite of the Sandfly, *Culicoides furens*.**

GREENBERG, B. **Fecundity and Cold Survival of the House Fly.**
J. Econom. Entom. 1955, Dec., v. 48, No. 6, 654-7, 1 fig.
[15 refs.]

Some workers have reported that isolated pairs of house-flies are less productive than flies kept together in larger numbers. But this has not been the experience of other workers. The author re-examines the question and finds that isolation of pairs of flies has no effect on fecundity. Thirty adult flies were kept outdoors for 2 months in early winter and 7 lived to survive nearly 2 consecutive days of temperatures between -1.2° and -8.5°C . (mean = -5.0°C .); they laid eggs 2 days after being brought into the warmth of indoors. Larvae were less able to withstand 7°C . for 6 days if previously reared at 36°C .; survival was high (88 to 100 per cent.) if reared at 21°C . Death in the former series may have been from starvation due to immobility. About 25 per cent. of pupae kept at 7°C . remained alive for 19 days, 5 per cent. for 31 days, and none after 38 days. This paper gives useful tabulations of the findings of previous authors in this field. D. S. Bertram

TERRIERE, L. C. & SCHONBROD, R. D. **The Excretion of a Radioactive Metabolite by House Flies treated with Carbon Labeled DDT.**
J. Econom. Entom. 1955, Dec., v. 48, No. 6, 736-9. [11 refs.]

"Resistant and susceptible house flies have been examined for evidence of metabolism of DDT up to 14 days after treatment with radioactive DDT. Susceptible flies, given sublethal doses, have been shown to excrete up to 88 per cent of the dose in the form of a water soluble conjugate. Resistant flies show a similar detoxification and excretion capacity. The excretion begins during the first day after treatment and appears to continue until all of the absorbed dose has been metabolized.

"The conjugate is hydrolysable with acid to produce a compound weakly acidic in nature. Attempts to identify this compound have met with no success although several possible structures have been eliminated."

KILPATRICK, J. W. & SCHOOF, H. F. **The Use of Insecticide Treated Cords for Housefly Control.** *Pub. Health Rep.* Wash. 1956, Feb., v. 71, No. 2, 144-50, 6 figs. [14 refs.]

"Cotton cords $3/32$ inch in diameter, impregnated in 10-percent and in 7.5-percent parathion-xylene solution, have given seasonal control of

insecticide-resistant housefly populations in dairy barns. Cords impregnated by immersion in a 25-percent Diazinon solution yielded 7 weeks' effective control. Cords treated with 7.5-percent parathion solutions provided excellent control of houseflies for more than 10 weeks in rural areas and for 10 weeks in a military dining hall and kitchen. Air samples in dairy barns and in kitchens of rural homes revealed only 0.02 microgram of parathion per liter of air. No significant changes in cholinesterase levels were noted in individuals processing or installing parathion- and Diazinon-treated cords."

VENDRAMINI, R. La lotta contro le mosche. Nuovi orientamenti e nuovi aspetti. [**New Outlook on the Control of House-Flies**] *Igiene e San. Pubblica*. Rome. 1955, May-June & July-Aug., v. 11, Nos. 5/6 & 7/8, 292-307; 360-81. [Numerous refs.] English summary.

The author recalls that, some 30 years ago, fly campaigns were successfully carried out without the use of modern insecticides. A number of towns were rendered practically fly-free (*e.g.*, Montecatini, where fly-borne enteric diseases were substantially abated between 1923 and 1931). These results were obtained mainly by energetic action to prevent accumulation of fly-breeding material. The introduction of DDT and later synthetic insecticides achieved good results with less trouble and gradually the hygienic measures were relaxed. When the flies became insecticide-resistant, therefore, bad conditions returned. The problem of insecticide resistance in house-flies is outlined with a series of fragmentary quotations from various authors.

In conclusion, the author calls for new anti-fly campaigns based on both old and new methods. Reduction of breeding should be done by sanitation and treatment of breeding grounds with arsenicals or "Berlese's mixture", which do not produce resistance. [The only reference given to this mixture is *Istruzioni pratiche per la distruzione della mosca domestica*, Publ. della R. Stazione di Entom. Agraria, Firenze.] The adults may be attacked by synthetic insecticides, with perhaps DDT, BHC plus chlordane and then phosphoric insecticides in succeeding years, in the hope that this will discourage polyvalent resistance.

J. R. Busvine

BUSHLAND, R. C., LINDQUIST, A. W. & KNIPLING, E. F. **Eradication of Screw-Worms through Release of Sterilized Males.** *Science*. 1955, Aug. 12, v. 122, 287-8.

Earlier experiments of BUSHLAND and HOPKINS [this *Bulletin*, 1954, v. 51, 322] showed that screw-worms (*Callitroga hominivorax*) were easily

sterilized by exposing pupae to X-rays or gamma rays, and that under laboratory conditions, although the males mated repeatedly, the females did so once only; also that a normal female mated with a sterilized male did not mate again and laid eggs that did not hatch; lastly, where populations of normal and sterilized flies were mixed in cages, the sterilized and normal males competed about equally for mates.

Later field experiments, conducted by the United States Department of Agriculture during 1951-53 in Florida, showed that continued releases of sterilized males greatly reduced the number of screw-worms, but conclusive results could not be obtained for lack of a suitably isolated population.

In 1954 an experiment was conducted on the island of Curaçao by the Entomology Research Branch, USDA, in cooperation with the Veterinary Service of the Government of the Netherlands Antilles; this island is beyond the flight range of these flies from the South American mainland. Five-day-old pupae, reared on the mainland, were sterilized by irradiation with 7,500 röntgens of gamma rays from cobalt-60, and flown to Curaçao, where the emergent flies were distributed by aeroplane. Initially the sterilized flies were released weekly at the rate of 100 males and 100 females per square mile over the 170 square miles of the island. As a result, 15 per cent. of the egg masses, collected from a number of goats penned at points well distributed over the island, failed to hatch, but this did not effect any reduction in the population, for after 7 weeks of releases appreciably more egg masses were collected per week than had been before the releases started. Then half of the island was treated with sterilized flies at the same rate, and the other half at 4 times this rate; in the first half 31 per cent. of the egg masses collected were then sterile, and in the second, 49 per cent. In August 1954 the higher rate of release was extended over the whole region, and after 4 weeks, 71 per cent. of the egg masses were sterile, and a marked decline in numbers was apparent; this in turn led to a higher ratio of sterile to fertile flies, so that after October 3 only two egg masses were collected—one on November 4 and the other on November 11, both non-viable. Penned goats, maintained until January 6, 1955, produced no more egg masses, and searches conducted from October 1, 1954 until July 1, 1955 revealed no cases of screw-worms in domestic animals; it appeared that screw-worm had been eradicated from the island of Curaçao.

[It may be noted that this method of control differs from most in that it becomes more efficient and more effective as it approaches completion; but it must also be remarked that this fly provides a subject particularly favourable to such a method of control in that its powers of rapid reproduction allow it to be bred artificially in large numbers, while its short biological cycle (completed in about 4 weeks under the climatic conditions prevailing in Curaçao) reduces the time necessary for continuation of the releases.]

W. H. Potts

LEON, L. A. & ANDRADE, M. Observaciones sobre la miyiasis ocular producida por el *Oestrus ovis* en el Ecuador (Diptera-Oestridae). [**Ocular Myiasis caused by *Oestrus ovis* in Ecuador**] *Rev. Ecuatoriana de Entom. y Parasit.* Guayaquil. 1954-1955, v. 2, Nos. 3/4, 377-88, 5 figs. on 2 pls. [22 refs.] English summary.

BARRERA, A. Las especies mexicanas del género *Pulex* Linnaeus (Siph., Pulicid.). [**Mexican Species of *Pulex***] *An. Escuela Nac. Ciencias Biol.* Mexico. 1955, Aug. 5, v. 8, Nos. 3/4, 219-36, 12 figs. [15 refs.] English summary.

MINISTÈRE DE LA SANTÉ PUBLIQUE. Paris. Rapport sur la fréquence et la sensibilité aux insecticides de *Pediculus humanus humanus* K. Linnaeus, 1758 (Anoplura) dans le Sud-Est de la France [NICOLI, R. M., under the direction of J. SAUTET]. [**Incidence of *Pediculus humanus* in South-East France and its Sensitivity to Insecticides**] *Monographie de l'Institut National d'Hygiène* No. 8. 79 pp., 3 maps & 13 graphs. [Numerous refs.] 1955. Paris (16^e): Inst. Nat. Hyg., 3, rue Léon-Bonnat.

In the first part of this work the authors describe and discuss the vagrants of the Marseilles district according to race, age, place of origin and way of life. Some 6,900 were examined altogether, half being from North Africa and one-third being French. About 12 to 15 per cent. were infested with lice, the proportion being about the same in all age-groups. A few observations on the lice, regarding numbers per host, proportions of sexes and survival without food, gave data not much different from those of earlier workers.

Resistance of the lice to various insecticides was mainly measured by tests in which the lice were put on to pieces of cloth dusted with either 0.1 per cent. DDT, or 0.25 per cent. gamma BHC or 0.02 per cent. pyrethrins. The tests were done at 26°C. in darkness, the lice being kept on the cloth under Petri dish covers. Effects were judged by inspections up to 144 hours and the lice categorized as normal, affected and dead. The resistance of lice from different hosts to the various insecticides varied considerably, especially to DDT. In an arbitrary classification these results were categorized as: absolute resistance (Ra), relative resistance (Rr), sub resistance (Sr), sub sensitivity (Ss) and sensitivity (S). The percentages of louse strains in the different classes were as follows:—

DDT:—(S) 80.5; (Ss) 15.2; (Sr) 2.6; (Rr) 0.8; (Ra) 0.8.

BHC:—(S) 97.2; (Ss) 1.4; (Sr) 1.4.

pyrethrins:—(S) 98.5; (Ss) 1.5.

The authors consider that low grades of resistance may perhaps be the source of absolute resistance.

In an appendix are results of tests of insecticides and the effects of cold on cockroaches, sandflies, hog lice and bed bugs. *J. R. Busvine*

HAINES, T. W. & PALMER, E. C. **Studies of Distribution and Habitat of Cockroaches in Southwestern Georgia, 1952-53.** *Amer. J. Trop. Med. & Hyg.* 1955, Nov., v. 4, No. 6, 1131-4. [11 refs.]

In recent years it has been shown that the cockroach, by virtue of its close association with man and sewerage systems, might be an important disseminator of certain enteric and other diseases of man. A study was made of the distribution and habitat of *Periplaneta fuliginosa*, *P. americana*, *P. brunnea* and *Blattella germanica* in an area in south-western Georgia where privies are the commonest means of excreta disposal.

Cockroaches were trapped inside and outside houses, in or around privies and in sewer manholes from August 1952 to July 1953. The authors observed that inside houses *B. germanica* was the most prevalent (86.6 per cent.), but during the hottest months *P. americana* and *P. brunnea* became more important. *P. fuliginosa* was the commonest species caught outside houses, occurring in large numbers also in and around privies. *P. americana* was most numerous (99 per cent.) in sewer manholes during the spring and summer. At the same time, this species occurred in large numbers inside houses and in and around privies. Since *P. americana* was not found in outside breeding places, it is suggested that it migrates from privies and sewers into houses, either by direct flight or perhaps through plumbing traps. Although rather few in numbers, *B. germanica* seemed to be more evenly distributed outside homes and in or around privies. *W. Z. Coker*

ANDERSON, Ann D. & MARCH, R. B. **Inhibitors of Carbonic Anhydrase in the American Cockroach, *Periplaneta americana* (L.).** 1956, Feb., v. 34, No. 1, 68-74. [26 refs.]

"Carbonic anhydrase activity has been demonstrated *in vitro* in preparations of the head, fat body, and gut of the American cockroach, *Periplaneta americana* (L.), and in the adult housefly, *Musca domestica* L. The insect factor, which is soluble in aqueous media and can be separated from the particulate cell fragments of insect tissue homogenates, is heat labile and sensitive to cyanide inactivation. It is strongly inhibited by sulphanilamide, *p*-aminoethylphenylsulphonamide, and *p*-chlorophenylsulphonamide. No inhibition has been found with N-substituted sulphonamides or with any of the organic insecticides examined, including DDT, lindane, dieldrin, nicotine, rotenone, pyrethrins, and para-oxon. Sensitivity of carbonic anhydrase to sulphonamides having an intact-SO₂NH₂ group is also characteristic of mammalian preparations. The data indicate that inhibition of insect carbonic anhydrase cannot be

an important factor in the mode of action of DDT or other organic insecticides."

ALESSANDRINI, Maria E. Nouvelle méthode de prélèvement du DDT ou d'autres insecticides sur des surfaces traitées. [**New Method of Recovering DDT or Other Insecticides from Sprayed Surfaces**] *Bull. World Health Organization*. Geneva. 1955, v. 13, No. 6, 999-1002.

The English summary appended to the paper is as follows:—

"A description is given of a new method of recovering superficial DDT or other insecticides from sprayed surfaces. The method consists in spreading a very thin layer of a type of silicone [Dow Corning Silicone Lubricant (High Vacuum Grease)] on a strip of parchment paper, and pressing the latter hard against the surface from which it is desired to recover the insecticide.

"The DDT is then dissolved in acetone, the solution is evaporated, and the amount of DDT in the residue is determined either by the Alessandrini method and the relevant chromatic scale (if the work is being done in the field and approximate results are sufficient) or by the method of Schechter et al. (if accurate results are required, and if an adequately equipped laboratory, with a suitable spectrophotometer or photocolormeter, is available)."

POWELL, E. O. & PEARCE, T. W. **The Rate of Evaporation of Particles in some Pesticide Aerosols.** *J. Hygiene*. 1955, Dec., v. 53, No. 4, 487-94, 2 text figs. & 2 figs. on pl.

MISCELLANEOUS PAPERS

WADDY, B. B. **Heights and Weights of Children in the Northern Territories of the Gold Coast.** *J. Trop. Med. & Hyg.* 1956, Jan., v. 59, No. 1, 1-4.

This paper records average heights and weights of boys and girls aged 6-13 years in 2 areas of the Gold Coast. The figures are compared with data from children of similar ages in the United Kingdom. The Gold Coast child of today corresponds in weight closely at all ages with the English child of 30 to 40 years ago, but is much lighter than contemporary English children. It is suggested that the differences in weight between Gold Coast and English children are "nutritional rather than

basic". These figures will provide a useful standard for assessing the health of future Gold Coast children and may prove of value in other parts of Africa.

R. Passmore

REPORTS AND SURVEYS

EAST AFRICA HIGH COMMISSION. **East African Virus Research Institute, Entebbe. Report No. 5, January 1954-June 1955** [HADDOW, A. J., Director]. 28 pp., 1 fig. 1955. Nairobi: Govt. Printer.

The unit has maintained the numerous lines of laboratory and field research which were being pursued in 1953 [this *Bulletin*, 1954, v. 51, 1206]. Results with encephalomyocarditis (EMC, formerly Mengo) virus now suggest that field rodents, generally highly susceptible, are important in the spread of the virus through their faeces and urine and infective carcasses. Domestic rats are less susceptible and survive with antibody formation. Mosquito transmission seems unlikely. There is a considerable account regarding Rift Valley fever [RVF] of the course of the infection in mice in relation to virus titre, with comments on incomplete virus. Three infections of laboratory staff occurred in the year. The amount of incomplete virus of RVF circulating in a mouse may be important in mosquito studies, few *Aedes aegypti* retaining virus if incomplete virus preponderates. A yellow fever survey of Zanzibar and Pemba islands indicated that mostly bush-babies in clove and coconut groves were being infected rather than those in thicket, or monkeys. Some notes are given on the age-grouping, breeding, and nocturnal activity of species of bush-baby. Field work in Karamoja, Uganda, has so far failed to reveal a monkey immune to yellow fever (28 specimens), or hyrax (24 specimens), but 16 per cent. of 142 bush-babies were immune. Immunity appears to be local within family groups, which adds some emphasis to the possibility of transmission by mites rather than by mosquitoes. Yellow fever surveys, combined with training functions, were made in Northern Rhodesia and Nyasaland, but results are not yet available.

Some preliminary approach is reported to studying the reason why yellow fever does not occur east of Africa. No firm evidence was obtained of yellow fever in the human population of the south Arabian coast (83 human sera) or in wild animals in Malaya (150 sera representing over a dozen kinds of animal). There is perhaps a barrier to the eastward spread of yellow fever within East Africa itself. Yellow fever has never been reported from Malaya and a recent survey shows no history of its occurrence. However, *Aedes aegypti* is abundant in Malaya, besides primates of the kind important in extra-human yellow fever in Africa and South America. Malayan strains of *A. aegypti*

proved capable (1 in 20 mosquitoes) of transmitting yellow fever by bite in laboratory tests. But they bit the monkeys with reluctance and it is questioned if in nature they feed on monkeys.

Transmission cycles in yellow fever alternative to those known to involve man, monkey and mosquitoes still demand attention. Spider and reduviid predators of mosquitoes did not retain virus taken up from virus-infected mosquitoes.

Work on the breeding and infecting of *Liponyssus galagus* experimentally on bush-babies infected with yellow fever and on recipient baby mice has been technically difficult, and with discouragingly variable or negative results. Much better progress seems possible by feeding the mites on lakes of defibrinated blood infected with virus. The method is well described.

Work is now being developed on the relationship of birds to viruses. As regards fowlpox, limited observations confirm mechanical transmission by contaminated mouthparts (*A. aegypti*). In another aspect of this topic, bird (White Leghorn fowl) bait is offered in 24-hour catches at ground and on tree platforms in Zika Forest near Entebbe. Some details are tabulated. Four species will bite both fowl and man in numbers and 24 other species are also able to accept either as host.

There are some notes on the rôle of the blood meal in *A. aegypti* physiology, on improved techniques of handling mosquito pupae (*A. aegypti*) and behavioural differences between strains of this species, on short-term density fluctuations in *Taeniorhynchus* species, and platform catches at Zika Forest in which the time of catching of every specimen is noted rather than collecting by hourly periods. *D. S. Bertram*

MOÇAMBIQUE. Missão de combate às tripanossomíases. Relatório anual de 1953 [DE ANDRADE SILVA, M. A.]. [**Annual Report for 1953 of the Trypanosomiasis Commission**] 126 pp., 1 coloured map & 17 figs. on 7 pls. [20 refs.] 1955. Lourenço Marques: Imprensa Nacional de Moçambique.

This report follows the general lines of its predecessors [see this *Bulletin*, 1954, v. 51, 1209, where references to the earlier reports may also be found].

A section on Survey contains new information as to the occurrence of *Glossina morsitans*, *G. pallidipes*, *G. austeni* and *G. brevipalpis*, with a map showing details of the new records of *G. austeni* in the coastal area north of Inhambane. A slow but inexorable advance of *G. morsitans* in the region of Zumbo is described, and believed to represent a return of the fly to regions evacuated by it after the widespread epidemic at the end of the last century.

No appreciable change in the distribution of human sleeping sickness is reported; there were 238 new cases, compared with the 200 of the

previous year. Of the new cases 107 were in the nervous phase of the disease; these were treated with Arsobal (Friedheim's Mel B); there were 5 deaths from its toxic action. The use of this drug is claimed to be a great step forward in the treatment of Rhodesian sleeping sickness. Failure of Spirotrypan [*ibid.*, 1953, v. 50, 1131] is recorded when it was used in 3 cases in the nervous stage of the disease, and it is recommended that this drug should not be used in Rhodesian sleeping sickness. The earlier cases were treated, as before, with Antrypol or pentamidine or a combination of the two. Prophylactic measures are described, which include an essay in the use of pentamidine.

The infection rates in domestic animals show little change from the figures of last year, being 5 per cent. in nearly 15,000 animals; *Trypanosoma vivax* is the commonest, with *T. congolense* next, and *T. brucei* occurring only very occasionally, and then in company with *T. vivax*. In wild animals the same two species of trypanosome predominate, both alone and in combination, with *T. brucei* again as a very occasional occurrence. Routine treatment for nagana was given to over 77,000 domestic animals with dimidium bromide (over 44,000) and Antrycide (nearly 33,000). Details are given in an appendix of results of experimental treatment with the metasulphate and the pro-salt of Antrycide; among the conclusions recorded are that *T. vivax* is more sensitive than *T. congolense* to these drugs; that the pro-salt is highly effective in protecting animals in passage through tsetse belts, but that subcurative doses of the metasulphate give rise to strains of trypanosomes resistant to normal curative doses both of this drug and of MB 1553. The commercial drug Babesin was tried against 55 cattle infected with *T. congolense* and 22 with *T. vivax*; 2 days after the injection no trypanosomes were found in the circulation, but this is a short time for their reappearance to be observed.

The resistance to attack from *G. brevipalpis* and *G. austeni* shown by the cattle of the Maputo region (referred to in last year's report, *loc. cit.*) is described and the conclusion reached that this is due rather to the good conditions of nurture in the area, and its favourable climate, as well as to the lower virulence of the local strains of trypanosomes, than to any real tolerance on part of the cattle, which, when moved to other fly areas (*e.g.*, *G. morsitans*), succumb to the disease; cattle from other districts brought to the Maputo area survive as well as do the local beasts. Investigation of the mildness of the Maputo trypanosome strains is proceeding.

Details are given of the operations for the control of tsetse carried out by the various entomological sections. Again, game destruction is the measure most commonly used against *G. morsitans*, a total of nearly 9,000 animals having been killed during the year; in one area over 15,000 animals have been killed since the start of operations there in 1946, and in another over 21,000 in the last 4 years; in this area fly rounds have shown a decrease in the total flies caught during the year, from 23,000

in 1950 to 686 this year. Against *G. austeni* partial discriminative clearing has continued; 1,135 hectares have been cleared, 842 by hand and 293 by tractors; 60 labourers cleared 3.2 hectares per day while two tractors cleared 1.6; for each hectare cleared, 10 hectares of country have been freed from tsetse; a report on this work is to be made to the meeting of the International Scientific Committee for Trypanosomiasis Research in Pretoria in the forthcoming year. An account of the measures taken for development and utilization of the land freed from tsetse is given. Progress of the ecological work mentioned in last year's report is referred to; activity of *G. austeni* on moonlight nights is noted [see also this *Bulletin*, 1949, v. 46, 337]. Mention is made of protective clearings against *G. pallidipes* in the Espungabera. A list is given of 25 publications relating to the work of the Commission which have appeared during the year. A series of plates illustrate mechanical clearing, use of sisal as a barrier to game and measures for the development of areas reclaimed from tsetse.

W. H. Potts

COLONIAL OFFICE. **Development and Welfare in the West Indies 1954**

[LUKE, S., Comptroller]. Colonial No. 320. 129 pp. 1955.

London: H.M. Stationery Office. [5s.]

In this report the sections dealing with public health record considerable progress and draw attention to the great problems which are being encountered. Many of the subjects mentioned have already been discussed in the medical literature, and it is only possible here to mention very briefly some of the more important matters.

Population pressure continues to increase owing to an excess of births over deaths of 25.3 per 1,000, while the infant mortality at 77 per 1,000 is the lowest ever recorded. Epidemic diseases were a source of concern. The reappearance of yellow fever in Trinidad involved extensive control measures, including prophylactic vaccine treatment of some 60 per cent. of the population and an attack on the *Aedes* index in urban areas. Control measures were also adopted in British Honduras after the occurrence of 2 cases of yellow fever in the adjacent Republic of Honduras; residual insecticidal spraying appears to have eliminated *A. aegypti* in the principal towns, and almost 75 per cent. of the population have voluntarily accepted protection by vaccine. Poliomyelitis also reappeared in serious epidemic form in some territories in 1954 and carried on into 1955.

In regard to endemic diseases, malaria control proceeded satisfactorily and eradication is now contemplated. Tuberculosis showed a declining death rate, but no evidence of a decrease in new infections. Mass vaccination campaigns have been completed in 5 territories and were initiated in 2 others in 1955, while accommodation for cases of tuberculosis was increased in many territories and is proposed in others. Some 50,000 blood samples were examined serologically for treponematoses and

positive reactions were found in 7 per cent., of which 4 per cent. were presumed to be due to syphilis and 3 per cent. to yaws. Mass treatment campaigns were planned for the Windward and Leeward Islands in 1955. Paralytic rabies in cattle, transmitted by bats, increased markedly in 1954 and, owing to the proximity of the main focus to South America, it is suggested that the disease is re-introduced from there. Infection of cattle has been noted also in Grenada and the mongoose has been suggested as the reservoir host.

Environmental hygiene is receiving attention in rural areas, and the installation of 30,000 domestic latrines in Barbados and 11,000 in St. Kitts is proposed. New health centres and maternal and child welfare clinics have been built, and health education is being received co-operatively by the people. Dried milk and nutrient supplements are given to school children in all the British territories in the area and to infants and pre-school children at clinics. Most of the territories import white flour which has been enriched with vitamins and minerals.

The housing problem, discussed under Housing and Planning, was aggravated by hurricane damage in 1950 and 1951 and is now very serious. In spite of the expenditure of large sums annually the programmes are insufficient to deal with existing slums or to satisfy new needs. Self-help housing has been fostered in several colonies and loans are made for repairs and building.

T. H. Davey

LIPPI, M. Le malattie infettive nel medio altipiano dello Yemen (Arabia). [**Infectious Diseases in the Middle Plateau of the Yemen (Arabia)**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1955, Oct., v. 36, No. 10, 537-54, 15 figs. [14 refs.] English summary (3 lines).

Lippi writes from 2 years' experience in the Civil Hospital at Taiz. He found tuberculosis to be the most common disease in the country, affecting women and children in particular, more especially in the plains. Out of 3,000 subjects examined by X-ray, Lippi and his colleagues have diagnosed 292 cases of pulmonary tuberculosis in all forms, 22 bone, 3 abdominal and 3 renal cases. Nutrition and housing are generally poor, but the people respond well to modern treatment and the author saw only 2 deaths among some hundred patients who had been admitted to hospital because of the severity of the disease.

Leprosy is very common, and a 40-bed hospital was set up on the author's advice. A leprosy settlement was being established on a hill near Taiz.

Schistosomiasis is widespread and the American Mission found *S. haematobium* in 12.4 per cent. of 218 urines and *S. mansoni* in 59 per cent. [43] of 73 stools examined. The author's own findings in 3,420 urines were 8 per cent. and in 2,264 stools 7.77 per cent.; he blames ablution practices at the mosques and bathing in irrigation waters as causes of spread.

Whooping cough attacks large numbers of small children with a case mortality of some 15 per cent. Its epidemics start in September or October and prophylactic inoculation is now available.

Vaccination is well accepted though not compulsory, and the incidence of smallpox is decreasing. Chickenpox is endemic. The author has seen paralytic conditions in both adults and children which he considers to be due to acute anterior poliomyelitis, though he has not observed this disease.

Neither malaria nor amoebiasis is confirmed in all but a proportion of the many subjects who ask for prescriptions against these infections, which were probably much more common before water supplies and drainage received any attention. The American Mission isolated *Shigella* from 14.3 per cent. and *Salmonella* (unspecified) from 0.6 per cent. of stools examined [number of specimens not stated]. They examined 193 specimens of blood serum in 1951 and found *Brucella* agglutinated at 1 in 40 in 3 cases and at 1 in 80 in 5. The people consume a good deal of raw milk but the author did not come across any cases of undulant fever.

Lippi has seen sporadic cases of measles, diphtheria, typhoid, mumps and typhus; the American Mission found 30.9 per cent. of 198 sera taken at Taiz to agglutinate *Proteus OX19* in dilutions of 1 in 40 or over. Relapsing fever is endemic and trachoma is widespread. Dengue occurs sporadically and in small outbreaks, and leishmaniasis has been seen in all its forms. Filariasis, yaws and gangosa have all been recorded, but no rabies in spite of many stray dogs. Lippi has seen one case of guineaworm contracted in Taiz and a number from other parts of the Yemen.

Syphilis is common: the American Mission obtained a positive Kahn in 56 per cent. of 260 sera; the author X-rayed the skeletal system of 232 subjects and found syphilitic lesions in 12 or 19.3 per cent.

The paper is illustrated with 15 photographs.

J. Cauchi

BOOK REVIEW

MARTINDALE. **The Extra Pharmacopoeia.** 23rd Edition. Vol. II. pp. xxi + 1501. 1955. Published by direction of the Council of the Pharmaceutical Society of Great Britain [STEINMAN, H. (M.P.S.), President]. London: The Pharmaceutical Press, 17, Bloomsbury Square, W.C.1. [57s. 6d.]

[This review appears also in the *Bulletin of Hygiene*, 1956, v. 31, June.]

The *Extra Pharmacopoeia* is so well known and so widely appreciated that this new edition of Volume II needs no commendation beyond saying

that it lives up to the author's aim of providing "a comprehensive reference book in which accurate and adequate information can be found quickly". The volume is a complete revision of the one it replaces [this *Bulletin*, 1944, v. 41, 243]. It has new sections on ion-exchange resins, titrations in non-aqueous media, microbiological assay of vitamins, compressed tablets, and haematology and clinical biochemistry. Many existing sections have been rewritten and rearranged, notably those on analytical addenda to materia medica in Volume I, food analysis, food law, recognition of organic substances, microchemical analysis, analytical adsorption spectrophotometry, bacteriological and clinical notes, radiotherapy and vitamins. The book is essential not only to medical men but also to many others not directly concerned with medicine who wish to trace scientific papers and publications on a wide variety of subjects by means of its thousands of abstracts and references.

Ease of reading and appearance have been greatly improved by the use of a larger page and a slightly larger type-face. John Rathborn

BOOK REVIEW